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DEPARTMENT OF NATURAL RESOURCES  
GEORGE D. NORDENHOLT, Director

DIVISION OF MINES  
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY

State Mineralogist

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# CALIFORNIA MINERAL PRODUCTION AND DIRECTORY OF MINERAL PRODUCERS FOR 1938

By  
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## LETTER OF TRANSMITTAL

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September, 1939

*To His Excellency, THE HONORABLE CULBERT L. OLSON,  
Governor of the State of California.*

SIR: I have the honor to herewith transmit Bulletin No. 117 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

GEORGE D. NORDENHOLT,  
Director, Department of Natural Resources.



## INTRODUCTION

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It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,  
State Mineralogist.





# MINERAL INDUSTRY, CALIFORNIA, 1938

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## **DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA**

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### CHAPTER ONE

The total value for the mineral output for California for the year 1938 was \$380,444,976, being an increase of \$18,929,025 over the total of 1937, which was \$361,515,951. There were sixty different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all fifty-eight counties of the State contributed to the list.

As revealed by the data following, the salient features of 1938 compared with the previous year were: The fuels, metals, and salines groups showed increases in total value, while structural materials and industrial minerals showed a decline. Of the year's mineral production petroleum showed the greatest increase in value of output; followed in turn by gold, natural gas, potash, soda magnesium salts, iron ore, salt, pumice and volcanic ash, quicksilver, and limestone; while those showing a decrease in amount and value were miscellaneous stone, brick and hollow building tile, copper, cement, silver, pottery clay, diatomite, lead, etc. Returned to the commercial after several years absence, were lithia salts and serpentine; and for the first time were added alum minerals and garnets.

Of the fuels, petroleum showed an increase in value of \$20,508,471 and an increase in amount from 238,558,562 barrels to 249,395,763 barrels of crude oil. There was no marked change in the price of crude from June, 1936. Natural gas showed an increase in value and amount from 323,883,710 M cu. ft. worth \$19,859,865 to 332,358,439 M cu. ft., worth \$22,310,755.

Of the metals, the gold output increased from 1,174,578 fine ounces to 1,311,129 fine ounces; and in value from \$41,110,230 to \$45,889,515. Quicksilver increased from 9,995 flasks worth \$837,789 to 12,171 flasks worth \$846,497. Iron ore, platinum and tungsten concentrates also showed an increased yield with all other metals showing a decline. Silver decreased from 2,888,265 fine ounces worth \$2,234,073, to 2,590,804 fine ounces worth \$1,674,863 and copper from 10,512,500 pounds worth \$1,272,013 to 1,613,491 pounds worth \$158,122.

Of the structural materials, slate, bituminous rock and limestone were the only substances to show an increased total value over the previous year, miscellaneous stone showing a decrease in total value from \$16,917,683 to \$11,734,038 and cement from 12,072,063 barrels

worth \$16,546,229 to 10,561,037 barrels worth \$15,502,574. The group as a whole showed a decline in total value from \$37,976,624 to \$30,880,924.

In the industrial group the total value decreased from \$6,159,918 to \$5,027,093. The total value of the saline group increased from \$13,216,270 to \$14,279,949, with all the products showing an increased value with the exception of borates.

#### By Substances.

The following table shows the comparative yield of mineral substances of California for 1937 and 1938, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bentonite (fuller's earth) . . . . .	8,425 tons	\$140,261	9,374 tons	\$113,164	\$27,097—
Borates . . . . .	326,099 tons	6,206,619	276,144 tons	5,014,237	1,192,650—
Brick and hollow building tile . . . . .		3,083,902		2,594,546	489,356—
Cement . . . . .	12,072,062 bbls.	16,546,229	10,561,037 bbls.	15,502,574	1,043,655—
Chromite . . . . .	1,918 tons	20,830			
Clay (pottery) . . . . .	354,669 tons	705,200	304,564 tons	582,608	112,592—
Coal . . . . .			275 tons	1,650	
Copper . . . . .	10,512,500 lbs.	1,272,013	1,613,491 lbs.	158,122	1,113,891—
Dolomite . . . . .	12,371 tons	24,603			
Feldspar . . . . .	2,686 tons	10,930			
Gems . . . . .		2,075		4,575	2,500+
Gold . . . . .	1,174,578 fine ozs.	41,110,230	1,311,129 fine ozs.	45,889,515	4,779,285+
Granite . . . . .		207,738		131,386	76,352—
Gypsum . . . . .	186,160 tons	384,431	161,996 tons	327,821	56,610—
Iron ore . . . . .	5,490 tons	29,340			
Lead . . . . .	2,402,110 lbs.	141,724	1,003,096 lbs.	46,142	95,582—
Lime . . . . .	69,532 tons	681,277	70,578 tons	683,403	2,126+
Limestone . . . . .	351,735 tons	830,562	302,655 tons	729,149	101,413—
Magnesium salts . . . . .	3,867 tons	316,669	24,176 tons	469,636	152,967+
Marble <sup>a</sup> . . . . .		23,667		6,015	17,552—
Mineral water . . . . .	18,309,729 gals.	1,130,810	26,900,959 gals.	853,998	276,812—
Natural gas . . . . .	323,883,714 M cu.ft.	19,859,865	332,358,439 M cu.ft.	22,310,755	2,450,890+
Petroleum . . . . .	238,558,562 bbls.	237,845,872	249,395,763 bbls.	258,354,343	20,508,471+
Platinum group . . . . .	530 fine ozs.	23,704	1,069 fine ozs.	35,150	11,446+
Pumice and volcanic ash . . . . .	10,392 tons	79,005	18,783 tons	105,207	26,202+
Quicksilver . . . . .	9,995 flasks	837,789	12,171 flasks	846,497	8,708+
Salt . . . . .	370,431 tons	1,044,325	395,746 tons	1,099,737	56,126+
Sandstone . . . . .		15,680		9,384	6,296—
Silica (sand and quartz) . . . . .	84,313 tons	348,987	63,167 tons	278,676	70,311—
Silver . . . . .	2,888,265 fine ozs.	2,234,073	2,590,804 fine ozs.	1,674,863	559,109—
Slate . . . . .		32,572	6,871 tons	30,281	2,291—
Soapstone and talc . . . . .	29,657 tons	347,772	28,346 tons	290,810	56,962—
Soda . . . . .	153,685 tons	1,461,057	178,105 tons	2,023,610	562,553+
Stone, miscellaneous <sup>b</sup> . . . . .		16,917,683		11,734,038	5,183,645—
Tungsten ore . . . . .	611 tons	782,187	768 tons	786,860	4,673+
Zinc . . . . .	39,643 lbs.	2,577	17,554 lbs.	843	1,734—
Unapportioned . . . . .		6,813,693		47,755,381	941,688+
<b>Totals</b> . . . . .		<b>\$361,515,951</b>		<b>\$380,444,976</b>	
Net increase . . . . .					<b>\$18,929,025</b>

<sup>a</sup> Included under "Unapportioned."

<sup>b</sup> Includes onyx and travertine.

<sup>c</sup> Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

<sup>d</sup> Includes barite, bituminous rock, bromine, carbon dioxide, calcium chloride, coal, diatomite, fluorspar, iodine, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-cyanite group, sulphur, zircon, tube-mill pebbles.

<sup>e</sup> Includes alum, barite, bituminous rock, bromine, carbon dioxide, calcium chloride, calcium silicate, chromite, diatomite, dolomite, feldspar, garnets, iodine, iron ore, lithia, magnesite, mica, potash, pyrite, sillimanite group, serpentine, sulphur, paving blocks, tube-mill pebbles.

**By Counties.**

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1937 and 1938:

County	1937	1938
Alameda.....	\$2,476,302	\$2,531,600
Alpine.....	22,791	11,123
Amador.....	3,917,866	3,880,444
Butte.....	1,798,992	2,177,265
Calaveras.....	3,279,250	4,357,938
Colusa.....	9,424	2,884
Contra Costa.....	1,887,309	2,116,285
Del Norte.....	30,647	15,997
El Dorado.....	2,607,972	2,207,099
Fresno.....	41,178,791	30,159,518
Glenn.....	136,368	60,138
Humboldt.....	100,715	97,181
Imperial.....	677,401	604,227
Inyo.....	1,439,009	1,583,893
Kern.....	74,182,134	71,528,574
Kings.....	11,008,597	15,410,875
Lake.....	392,585	281,098
Lassen.....	86,240	59,546
Los Angeles.....	100,337,635	125,027,054
Madera.....	133,165	29,916
Marin.....	300,204	189,843
Mariposa.....	1,270,774	1,588,861
Mendocino.....	114,705	46,378
Merced.....	2,535,128	2,867,501
Modoc.....	36,990	5,896
Mono.....	804,925	349,516
Monterey.....	262,651	187,144
Napa.....	356,146	637,963
Nevada.....	11,385,056	11,867,896
Orange.....	22,659,380	21,801,082
Placer.....	1,754,040	2,020,042
Plumas.....	2,354,957	878,277
Riverside.....	4,057,127	3,306,793
Sacramento.....	4,230,889	5,467,487
San Benito.....	504,510	527,192
San Bernardino.....	16,012,330	16,752,866
San Diego.....	591,479	535,722
San Francisco.....	41,825	33,607
San Joaquin.....	706,620	781,907
San Luis Obispo.....	323,691	242,500
San Mateo.....	2,310,784	2,026,217
Santa Barbara.....	10,709,056	10,683,722
Santa Clara.....	722,903	624,463
Santa Cruz.....	2,074,463	1,907,188
Shasta.....	2,199,423	1,791,727
Sierra.....	974,680	905,237
Siskiyou.....	1,200,351	1,510,815
Solano.....	145,567	431,677
Sonoma.....	273,063	232,495
Stanislaus.....	940,030	845,523
Sutter.....	22,959	28,873
Tehama.....	65,193	81,431
Trinity.....	721,290	1,493,132
Tulare.....	314,952	273,199
Tuolumne.....	1,012,180	1,130,263
Ventura.....	19,230,720	21,966,416
Yolo.....	44,171	48,232
Yuba.....	2,587,748	2,633,138
Total value.....	\$361,515,951	\$380,444,976

**Total Mineral Production of California, by Years, Since 1887.**

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later

Plumas County. Cement increased rapidly from 1902, while crushed rock, sand and gravel as a group paralleled the cement increase. Quicksilver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915-1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these have since declined, though silver, structural materials and copper increased in 1920-1924, also lead and magnesite in 1923; lead and zinc in 1925; zinc in 1926, with silver declining; an increase in quicksilver in 1927-1928, with declines in other metals and by petroleum. Natural gas showed a steady increase from 1907, and in 1928-1933 its value was second only to petroleum.

In 1929 the annual output of gold was the smallest since its discovery. From 1929 to 1938 there was a rapid increase in gold production, due in part to the raise in its price per ounce.

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	\$19,785,868	\$13,588,614	\$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,544,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,910,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,820
1906	46,776,085	18,732,452	9,233,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,370	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,024,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,635,723
1932	199,196,493	11,765,726	142,890,247
1933	206,489,058	15,683,075	143,063,972
1934	237,374,709	25,131,284	159,529,671
1935	263,404,317	31,165,050	179,335,311
1936	327,804,268	37,710,470	211,667,185
1937	361,515,951	41,110,230	237,845,872
1938	380,444,976	45,889,515	258,345,343
Totals	\$8,044,299,074	\$913,439,263	\$5,117,608,016

## CHAPTER TWO

## FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values of which make up practically 74 per cent of the State's entire mineral output for the year 1938.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stock-food preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1937 and 1938 is shown in the following table:

Substance	1937		1938		Increase + Decrease - Value
	Amount	Value	Amount	Value	
Coal.....	369 tons	\$2,933	275 tons	\$1,650	\$1,283—
Natural gas.....	323,883,714 M cu.ft.	19,859,865	332,358,439 M cu.ft.	22,310,755	2,450,890+
Petroleum.....	238,558,562 bbls.	237,845,872	249,395,763 bbls.	258,354,343	20,508,471+
Total value.....		\$257,708,670		\$280,666,748	
Net increase.....					\$22,958,078

## COAL

*Bibliography:* State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, P. III.

The coal production in California during 1938 totaled 275 short tons valued at \$1,650, as compared with the 1937 output which was 369 short tons worth \$2,933. The material mined 1938 came from a single property each, in Amador, San Benito, and Trinity counties. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

**Total Coal Production of California.**

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:

## Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861	6,620	\$38,065	1901	150,724	\$401,772
1862	23,400	134,550	1902	88,460	248,622
1863	43,200	248,400	1903	93,026	265,383
1864	50,700	291,525	1904	79,062	376,494
1865	60,530	348,048	1905	46,500	144,500
1866	84,020	483,115	1906	24,850	61,600
1867	124,690	716,968	1907	23,734	55,549
1868	143,676	826,137	1908	18,496	55,503
1869	157,234	904,096	1909	49,389	216,913
1870	141,890	815,868	1910	11,033	23,484
1871	152,493	876,835	1911	11,047	18,297
1872	190,859	1,097,439	1912	14,484	39,092
1873	186,611	1,073,013	1913	25,198	85,809
1874	215,352	1,238,274	1914	11,859	28,806
1875	166,638	958,169	1915	10,299	26,662
1876	128,049	736,282	1916	4,037	7,030
1877	107,789	619,787	1917	3,527	7,691
1878	134,237	771,863	1918	6,343	16,149
1879	147,879	850,304	1919	2,983	8,203
1880	236,950	1,362,463	1920	2,078	5,450
1881	140,000	805,000	1921	12,467	63,578
1882	112,592	647,404	1922	27,020	135,100
1883	76,162	380,810	1923	1,010	5,090
1884	77,485	309,950	1924	1,425	8,800
1885	71,615	286,460	1925	730	3,880
1886	100,000	300,000	1926	1,100	5,000
1887	50,000	150,000	1927	200	1,100
1888	95,000	380,000	1928	782	4,542
1889	121,280	288,232	1929	450	2,476
1890	110,711	283,019	1930	10,885	59,858
1891	93,301	204,902	1931	12,551	77,007
1892	85,178	209,711	1932	9,508	36,468
1893	72,603	167,555	1933	2,612	11,367
1894	59,887	139,862	1934	13,549	52,720
1895	79,858	193,790	1935	8,049	32,745
1896	70,649	161,335	1936	370	1,815
1897	87,449	196,255	1937	269	2,933
1898	143,045	337,475	1938	275	1,650
1899	160,941	420,109			
1900	176,956	535,531			
			Totals	5,267,910	\$23,388,639

The tonnages in the above table for the years 1861-1866 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93-94), being an average of \$5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

## NATURAL GAS

*Bibliography:* State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX. Bulletins 3, 16, 19, 69, 73, 89. Monthly Summary Oil and Gas Supervisor, Dec., 1919; Aug. 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not over-estimated, particularly in the seven oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of small amounts of gas and transporting it for any considerable distance may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas

production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

**Actual Production of Natural Gas—How Disposed of in California—1938**

County	Production M cubic feet	Utilized M cubic feet	Wasted M cubic feet	Stored M cubic feet
Fresno.....	62,481,144	58,337,848	3,071,648	1,071,648
Kern.....	80,442,603	68,974,794	5,951,004	5,516,805
Kings.....	57,013,559	53,242,662	2,803,372	967,525
Los Angeles.....	91,560,826	73,790,818	17,449,845	320,163
Orange.....	22,012,416	20,551,546	1,429,977	30,893
San Joaquin.....	5,817,591	5,720,352	97,239	-----
Santa Barbara.....	5,676,608	4,655,732	864,327	156,549
Solano.....	3,783,466	3,760,158	23,308	-----
Ventura.....	44,058,744	43,239,220	216,301	603,223
Other counties.....	85,309	85,309	-----	-----
<b>Totals.....</b>	<b>372,932,266</b>	<b>332,358,439</b>	<b>31,907,021</b>	<b>8,666,806</b>

### Production and Value.

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1938 gave from 1.5¢ to 69¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1938 works out at approximately 6.71¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

**Utilized Production of Natural Gas in California, 1938**

County	M cubic feet	Value
Fresno.....	58,337,848	\$3,626,724
Kern.....	68,974,794	4,244,897
Kings.....	53,242,662	3,290,978
Los Angeles.....	73,790,818	5,451,390
Orange.....	20,551,546	1,510,990
San Joaquin.....	5,720,352	503,667
Santa Barbara.....	4,655,732	327,466
Solano.....	3,760,158	354,926
Ventura.....	43,239,220	2,990,127
Butte, Glenn, Humboldt, Mendocino, Monterey, Sutter, Tulare, Yolo*	85,309	9,590
<b>Totals.....</b>	<b>332,358,439</b>	<b>\$22,310,755</b>

\* Combined to conceal the output of individual operators in each.

The above totals showed an increase in amount and value compared with the figures of the previous year, which were 323,883,714 M cu. ft. worth \$19,859,865. Los Angeles County led in the yield of natural gas during 1938, followed in turn by Kern and Fresno counties. Increased value of output was shown by Kern, Kings, and Los Angeles counties; while a decrease was shown by all other counties.

**Natural Gas Production in California Since 1888.**

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854-1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

**Natural Gas Production in California Since 1888**

Year	M cubic feet	Value	Year	M cubic feet	Value
1888.....	*12,000	\$10,000	1914.....	16,529,963	\$1,049,470
1889.....	*14,500	12,680	1915.....	21,992,892	1,706,480
1890.....	*41,250	33,000	1916.....	28,134,365	2,871,751
1891.....	*39,000	30,000	1917.....	44,343,020	2,964,922
1892.....	*75,000	55,000	1918.....	46,373,052	3,289,524
1893.....	*84,000	68,500	1919.....	52,173,503	4,041,217
1894.....	*85,000	75,000	1920.....	58,567,772	3,898,286
1895.....	*110,000	100,000	1921.....	67,043,797	4,704,878
1896.....	*131,000	110,157	1922.....	103,628,027	6,990,030
1897.....	*71,300	62,657	1923.....	240,405,397	15,661,433
1898.....	*111,165	74,424	1924.....	209,021,596	15,153,140
1899.....	115,110	95,000	1925.....	194,719,924	15,890,082
1900.....	40,566	34,578	1926.....	214,549,477	19,465,347
1901.....	120,800	92,034	1927.....	224,686,940	20,447,294
1902.....	120,968	99,443	1928.....	260,887,116	22,260,947
1903.....	120,134	75,237	1929.....	400,129,201	29,675,546
1904.....	144,437	91,035	1930.....	315,513,952	24,559,840
1905.....	148,345	102,479	1931.....	344,959,920	16,690,695
1906.....	168,175	109,489	1932.....	284,168,872	16,272,061
1907.....	169,991	114,759	1933.....	271,743,544	15,403,514
1908.....	842,883	474,584	1934.....	263,207,517	14,408,761
1909.....	1,148,467	616,932	1935.....	302,447,193	17,680,661
1910.....	10,579,933	1,676,367	1936.....	298,922,708	18,585,970
1911.....	*5,000,000	491,859	1937.....	323,833,714	19,859,865
1912.....	*12,600,000	940,076	1938.....	332,358,439	22,310,755
1913.....	14,210,836	1,053,292			
			Totals.....	4,967,596,761	\$342,540,871

\* Quantity, in part, estimated, where values only were reported.

<sup>b</sup> Tabulations published previously to 1933 included values of CO<sub>2</sub>, now shown under "Industrial Materials."

**Gasoline from Natural Gas.**

More or less gas usually accompanies the petroleum in the old fields, and such gas carries varying amounts of gasoline. A total of 95 plants were in operation in 1938 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 576,673,643 gallons of casing-head gasoline valued at \$34,150,247 was reported made from all fields in California by 95 plants during 1938 compared with 649,774,253 gallons worth \$40,051,437 from 94 plants in 1937. In 1938 there was also a total of 24,243,094 gallons of liquified petroleum gas produced for chemical manufacturing, industrial and domestic fuel. The 1938 output was distributed as follows:



County	No. plants	Gallons	Value
Fresno.....	1	104,634,004	\$6,222,277
Kern.....	21	66,738,641	3,836,993
Kings.....	8	78,653,598	4,689,138
Los Angeles.....	34	183,201,646	10,758,111
Orange.....	12	64,281,504	4,153,509
Santa Barbara.....	7	15,468,953	897,929
Ventura.....	12	63,695,297	3,592,290
Totals.....	95	576,673,643	\$34,150,247

The usual recoveries of gasoline from natural gas vary from  $\frac{1}{2}$  gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen <sup>1</sup> gives the average recovery for 1938 as 1.711 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	M cubic feet natural gas treated	Gallons of gasoline recovered	Recovery gallons per M cu. ft.
Oil absorption.....	388,015,152	663,993,285	1.711

## PETROLEUM

*Bibliography:* State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI, XXXIII-XXXIV. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1938 amounted to a total of 249,395,763 barrels having a value of \$258,354,343 at the well. This was an increase in both amount and value as compared with the 1937 output which was 238,558,562 barrels worth \$237,845,782.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929-1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in

<sup>1</sup> Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1938), U. S. Bureau of Mines.

each field<sup>1</sup> and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The value given to the 1934-1938 petroleum output by this department was obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

**TABLE A**  
Production and Value of Crude Oil by Counties

County	1937		1938	
	Barrels	Value	Barrels	Value
Fresno.....	29,031,322	\$36,521,804	20,784,106	\$26,201,849
Kern.....	69,878,714	61,905,918	66,033,496	58,803,255
Kings.....	5,800,589	8,062,833	8,717,827	12,117,779
Los Angeles.....	86,659,477	83,922,309	106,545,794	113,407,606
Orange.....	22,060,820	20,854,524	20,667,775	19,768,434
Santa Barbara.....	8,273,815	8,961,642	9,555,145	9,309,262
Ventura.....	16,720,713	17,562,688	16,979,962	18,707,689
San Bernardino, San Luis Obispo, San Mateo, Santa Clara, Tulare*	73,112	54,154	51,658	88,469
Totals.....	238,558,562	\$237,845,872	249,395,763	258,354,343

\* Combined to conceal the output of operators in each.

The foregoing totals show an average price of \$1.038 per barrel for the year 1938, as compared with .997 in the year 1937. \$0.986 in 1936, \$0.870 in 1935, \$0.913 in 1934, \$0.831 in 1933, and \$0.807 in 1932.

**TABLE B**  
Average Price of Oil per Barrel, by Counties, 1929-1938

County	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Fresno.....	\$0.519	\$0.568	\$0.551	\$0.556	\$0.573	\$0.650	\$0.941	\$1.209	\$1.255	\$1.261
Kern.....	.741	.838	.636	.658	.665	.729	.729	.863	.886	.890
Kings.....	1.674	1.515	.723	.837	.934	1.085	1.045	1.338	1.390	1.390
Los Angeles.....	1.189	1.208	.784	.860	.892	.990	.914	.974	.968	1.064
Orange.....	.986	1.060	.753	.762	.827	.937	.898	.937	.945	.956
San Luis Obispo.....				.550						
Santa Barbara.....	1.255	1.404	.954	.962	.848	.951	.924	1.143	10.83	.974
Santa Clara.....				.550						
Ventura.....	1.150	1.396	.771	.849	.838	.944	.901	.971	1.050	1.102
State averages...	\$1.094	\$1.195	\$0.753	\$0.807	\$0.831	\$0.913	\$0.970	\$0.986	\$0.997	\$1.038

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

#### TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San

<sup>1</sup> By courtesy of Standard Oil Company of California.

Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,<sup>1</sup> in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877." <sup>2</sup>

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rincon, Ventura County, were the new

<sup>1</sup> Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.

<sup>2</sup> *Idem*, p. 301.

fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Fresno, Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

**TABLE C**  
**Total Petroleum Production in California**

Year	Barrels	Value	Year	Barrels	Value
To and including 1875.....	*175,000	b\$472,500	1908.....	48,306,910	\$26,566,181
1876.....	12,000	30,000	1909.....	58,191,723	32,398,187
1877.....	13,000	29,250	1910.....	77,697,568	37,689,542
1878.....	15,227	30,454	1911.....	84,648,157	40,552,088
1879.....	19,558	39,716	1912.....	89,689,250	41,868,344
1880.....	40,552	80,828	1913.....	98,494,532	48,578,014
1881.....	99,862	124,828	1914.....	102,881,907	47,487,109
1882.....	128,636	257,272	1915.....	91,146,620	43,603,837
1883.....	142,857	285,714	1916.....	90,262,557	57,421,334
1884.....	262,000	655,000	1917.....	95,396,309	86,976,209
1885.....	325,000	750,750	1918.....	99,731,177	127,459,221
1886.....	*377,145	b\$70,205	1919.....	101,182,962	142,610,563
1887.....	678,572	1,357,144	1920.....	103,377,361	178,394,937
1888.....	690,333	1,380,666	1921.....	112,599,860	203,138,225
1889.....	303,220	368,048	1922.....	138,468,222	173,381,265
1890.....	307,360	384,200	1923.....	262,875,690	242,731,309
1891.....	323,600	401,264	1924.....	228,933,471	274,652,874
1892.....	385,049	561,333	1925.....	232,492,147	330,609,829
1893.....	470,179	608,092	1926.....	224,673,281	345,546,677
1894.....	753,078	1,064,521	1927.....	231,195,774	260,735,498
1895.....	1,245,339	1,000,235	1928.....	231,811,465	229,998,680
1896.....	1,257,780	1,180,793	1929.....	292,534,221	321,366,863
1897.....	1,911,569	1,918,269	1930.....	227,328,988	271,699,046
1898.....	2,249,088	2,376,420	1931.....	188,310,605	141,835,723
1899.....	2,677,875	2,660,793	1932.....	177,745,286	142,890,247
1900.....	4,319,950	4,152,928	1933.....	172,130,362	143,063,972
1901.....	7,710,315	2,961,102	1934.....	174,721,282	159,529,671
1902.....	14,366,910	4,692,189	1935.....	205,979,855	179,335,311
1903.....	24,340,539	7,313,271	1936.....	214,776,227	211,667,185
1904.....	29,736,003	8,317,809	1937.....	258,558,562	237,846,872
1905.....	34,275,701	9,007,820	1938.....	249,395,763	258,354,343
1906.....	32,624,000	9,238,020			
1907.....	40,311,171	16,783,943			
			Totals.....	5,148,116,162	\$5,121,223,533

\* U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

b Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.

## Well Data:

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D  
Wells Operated, by Fields, 1938

Field	Wells producing Dec., 1937	Wells producing Dec., 1938	Wells completed during year	Daily initial output	Wells abandoned during year	Bbls. per well produced per day Dec., 1937	Bbls. per well produced per day Dec., 1938
<b>GROUP No. 1—Belridge—North</b> .....	50	59	21	29,966	2	323.0	219.8
Belridge—South.....	127	87	4	165	0	12.2	13.6
Canal.....	1	15	12	27,917	0	467.0	259.5
Canfield Ranch.....	1	1	3	5,142	2	.....	41.0
Coalinga.....	914	816	12	13,856	28	16.5	11.7
Coles Levee.....	1	1	1	826	0	.....	179.0
Edison.....	89	88	2	285	3	42.5	28.6
Elk Hills.....	170	170	2	65	3	64.5	59.7
Fruitvale.....	159	174	18	4,825	3	54.6	42.4
Greeley.....	10	11	7	13,117	10	377.2	200.7
Kern River.....	1,334	1,369	26	1,163	8	11.5	8.3
Kettleman Middle Dome.....	3	3	.....	.....	0	29.3	13.0
Kettleman North Dome.....	179	218	30	60,254	5	459.1	274.6
Lost Hills.....	204	243	5	424	8	18.0	13.2
McKittrick.....	217	187	5	588	20	20.1	18.6
Midway-Sunset.....	2,525	2,519	33	3,328	53	29.4	22.5
Mountain View.....	196	189	3	3,533	12	79.2	48.9
Mount Poso.....	278	265	17	3,460	18	75.3	52.1
Rio Bravo.....	1	24	23	79,434	0	2,559.0	358.5
Round Mountain.....	161	193	35	9,684	15	106.6	66.8
Ten Section.....	8	26	25	60,820	0	457.8	335.3
Tupman.....	.....	.....	1	3,752	0	.....	.....
Wasco.....	.....	3	2	9,528	2	.....	211.0
Wheeler Ridge.....	28	27	.....	.....	0	11.1	11.4
<b>GROUP No. 2—Capitan</b> .....	40	51	6	2,457	0	75.4	55.1
Elwood.....	83	80	.....	.....	3	92.1	60.1
Rincon.....	36	51	9	2,637	0	85.3	75.2
San Miguelito.....	15	19	4	3,027	1	246.0	131.0
Santa Barbara.....	36	34	1	30	5	15.8	12.4
Santa Maria.....	285	304	86	80,831	18	48.6	51.4
Summerland.....	19	18	.....	.....	0	1.6	1.3
Ventura Avenue.....	254	258	22	27,557	1	140.5	131.4
Ventura-Newhall.....	578	559	14	5,310	15	8.6	9.4
Watsonville.....	7	7	.....	.....	0	8.6	2.3
<b>GROUP No. 3—Brea-Orinda</b> .....	347	350	1	32	4	17.7	16.1
Coyote—East.....	83	86	4	1,285	1	49.7	32.1
Coyote—West.....	33	49	5	1,076	2	280.4	166.3
Dominguez.....	164	207	16	4,284	2	181.0	118.0
El Segundo.....	49	52	20	11,364	20	407.2	96.3
Huntington Beach.....	573	551	9	843	15	61.8	55.6
Inglewood.....	195	208	1	267	0	83.3	62.1
Lawndale.....	6	6	.....	.....	0	14.8	12.2
Long Beach.....	1,242	1,260	32	7,949	31	46.8	41.2
Los Angeles—Salt Lake.....	113	112	.....	.....	3	5.0	4.3
Montebello.....	206	221	32	32,667	6	35.1	74.1
Playa Del Rey.....	203	183	.....	.....	16	37.5	30.3
Potrero.....	11	13	2	1,110	0	78.7	77.8
Richfield.....	282	293	18	3,241	13	35.7	28.0
Rosecrans.....	83	112	31	32,873	9	67.4	132.6
Santa Fe Springs.....	659	590	2	141	21	62.2	51.1
Seal Beach.....	109	109	1	194	1	85.1	71.8
Torrance.....	531	659	129	39,648	12	14.3	29.2
Whittier.....	155	147	.....	.....	0	5.9	6.1
Wilmington.....	348	590	261	312,096	5	179.5	156.2
<b>GROUP No. 4—Gas Fields:</b>							
Buena Vista Lake.....	5	4	.....	.....	.....	.....	.....
Buttonwillow.....	16	26	.....	.....	1	.....	.....
Chowchilla.....	.....	.....	.....	.....	.....	.....	.....
Delano.....	1	.....	.....	.....	.....	.....	.....
Dudley Ridge.....	.....	.....	.....	.....	.....	.....	.....
Goleta.....	1	.....	.....	.....	.....	.....	.....
McDonald Island.....	4	5	1	Gas	.....	.....	.....
Rio Vista.....	11	22	6	Gas	1	.....	.....
Semi-Tropic.....	20	1	.....	.....	2	.....	.....
Tracy.....	6	5	.....	.....	.....	.....	.....
Miscellaneous drilling.....	.....	.....	.....	.....	117	.....	.....
<b>Totals.....</b>	<b>13,463</b>	<b>13,930</b>	<b>1,000</b>	<b>920,851</b>	<b>517</b>	<b>52.4</b>	<b>46.4</b>

**Specific Gravity of Oils Produced.**

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Standard Oil Company. Specific gravities in California range from 8°

**TABLE E**  
**Production of Light and Heavy Oils, by Fields, for 1938**

Field	Under 20° (barrels)	20° and above (barrels)	Total (barrels)
San Joaquin Valley—			
Belridge—North	4,071	4,875,557	4,879,628
Belridge—South	24,018	413,172	437,190
Canal		847,404	847,404
Canfield Ranch		35,111	35,111
Cosalinga	1,966,313	1,698,263	3,664,576
Coles Levee		5,550	5,550
Devils Den	3,354		3,354
Eaton	517,922	566,497	1,084,419
Elk Hills	1,001,442	2,877,301	3,886,743
Fruitvale	2,661,641	465,579	3,127,220
Gatchell		239,009	239,009
Grapevine		52,248	52,248
Greelev		1,163,673	1,163,673
Kettleman Hills (North Dome)		25,609,197	25,609,197
Kettleman Hills (Middle Dome)		20,106	20,106
Kern River	4,001,756		4,001,756
Lost Hills	635,804	664,350	1,300,154
M-Kittrick	1,278,334	4,828	1,283,162
Midway-Sunset	8,327,491	14,550,782	22,878,273
Mountain View	3,271	4,009,381	4,012,652
Mount Poso	6,196,853		6,196,853
Poso Creek	630,146		630,146
Richfield Western		1,668	1,668
Rio Bravo		1,988,428	1,988,428
Round Mountain	5,269,841	140,701	5,410,542
Ten Section		2,476,032	2,476,032
Terra Bella	270		270
Wasco		126,698	126,698
Wheeler Ridge		113,036	113,036
Coastal—			
Arroyo Grande	17,600	13,943	31,543
Capitan		1,064,213	1,064,213
Elwood		2,247,760	2,247,760
Lompoc	58,150	20,750	78,900
Newhall	7,050	323,076	330,126
Rincon		1,395,553	1,395,553
San Miguelito		1,043,225	1,043,225
Santa Barbara Mesa	162,214		162,214
Santa Maria	5,155,838	867,414	6,023,252
Summerland	11,965		11,965
Ventura Avenue		12,924,549	12,924,549
Ventura County	74,785	1,494,354	1,569,139
Watsonville	21,900		21,900
Southern California—			
Coyote (East)	29,605	1,230,763	1,260,368
Coyote (West)		3,032,384	3,032,384
Del Rey	59,314	2,246,953	2,306,267
Dominguez		9,756,772	9,756,772
El Segundo	357,027	3,514,338	3,871,365
Huntington Beach	527,463	11,394,617	11,922,080
Inglewood	262,441	5,077,586	5,340,027
Lawndale		28,346	28,346
Long Beach	68,726	20,451,081	20,519,807
Los Angeles	73,156		73,156
Montebello	154,801	3,996,261	4,151,062
Olinda Brea	227,022	1,894,937	2,121,959
Potrero		220,275	220,275
Richfield	688,388	2,663,183	3,351,571
Rosecrans		3,738,107	3,738,107
Salt Lake	123,552		123,552
Santa Fe Springs	13,967	12,609,476	12,623,443
Seal Beach		3,195,202	3,195,202
Torrance	1,586,225	3,630,539	5,216,764
Whittier	229,897	107,391	337,288
Wilmington	10,828,148	23,330,063	34,158,211
Miscellaneous	700		700
Grand totals	53,270,461	196,517,742	249,788,203

Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Mariopaca; Wheeler Ridge, Kern County.

#### Oil in "Storage."

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast<sup>1</sup> territory totaled 158,477,420 barrels December 31, 1938, as compared with 128,040,247 barrels on December 31, 1937. The total decrease in stock over the preceding year was 30,437,173 barrels.

	Dec. 31, 1938 (barrels)
1. Gasoline-bearing crude.....	37,018,443
2. Nongasoline-bearing crude.....	16,282,177
3. Unblended natural gasoline.....	2,699,455
4. Gasoline (not including distributing and service stations).....	13,259,369
5. Naphtha distillates.....	*1,566,349
6. Gas oil and Diesel oil.....	10,539,937
7. Fuel oil residuum.....	70,957,881
8. All other stocks.....	6,153,809
Total.....	158,477,420

\*Estimated amount of unfinished gasoline contained in Item No. 5, 1,350,379 barrels.

#### Utilization of California Crude Oil.

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oilfields and from these reservoirs by pipelines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

During 1938 the crude oil consumed in California according to the U. S. Bureau of Mines<sup>2</sup> was 195,070,000 barrels sent to the still at the refineries; 26,053,000 barrels to Pacific foreign shipment; 725,000 barrels Atlantic foreign shipments, 923,000 barrels to intercoastal shipments; 11,203,000 barrels were either consumed as fuel or added to residuum and nongasoline-bearing crude; and 1,422,000 barrels to domestic market and loss not accounted for elsewhere.

<sup>1</sup>American Petroleum Institute: Summary of California Oilfield Operations for December, 1938.

<sup>2</sup>Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1938, U. S. Bureau of Mines.

The production of petroleum products during 1938 is shown in Table F:

TABLE F

Commodity	Amount in barrels
Crude petroleum to stills.....	195,069,000
Natural gasoline including liquid petroleum gas.....	15,870,000
Gasoline.....	73,020,000
Kerosene.....	4,914,000
Lubricating oils and greases.....	2,607,000
Gas oil and Diesel oil.....	26,737,000
Residuum and gasoline-bearing crude <sup>a</sup> .....	84,446,000
Asphalt and road oils.....	5,969,000
Coke (in tons).....	317,000
Shortage and still gas production.....	7,547,000
Total petroleum (net) <sup>b</sup> .....	210,959,000

<sup>a</sup> Includes 11,203,000 bbls. of heavy crude oil.

<sup>b</sup> Total of crude oil and natural gas gasoline.

#### Operating Data.

The following tabulation (Table G) is compiled from data published by the State Division of Oil and Gas,<sup>1</sup> semiannually, and here combined to show the entire year's operations for all fields. The districts are the geographical subdivisions as administered by that Division and which are outlined on the accompanying map.

It will be noted that the State average yield of oil per-well-per-day was 89.8 barrels for the first six months of 1938 and 88.9 barrels for the second. This is somewhat higher than the figures 46.4 barrels average for December derived from American Petroleum Institute data as shown in Table D, on a previous page, due in part at least, to the fact that the latter is on a full-time basis, whereas the Division's figures allow for shut-down time.

<sup>1</sup> Summary of Operations—California Oil Fields; Division of Oil and Gas, Fifteenth Annual Report of State Oil and Gas Supervisor, Vol. 34, No. 1, July, Aug., Sept., 1938, and No. 3, Jan., Feb., March, 1939.



TABLE G. Production Statistics and Operating Data of California Oil Fields—1938

Field	January 1 to June 30					July 1 to December 31						
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percent- age of time wells produced	Average number of producing wells— actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percent- age of time wells produced
				Oil	Water					Oil	Water	
Distr. 1—Aliso Canyon.....	4	23,950	706	34.0	25.4	97.5	1	23,418	67	349.5	4.1	36.4
Beverly Hills.....	323	1,101,925	51,494	21.4	16.7	88.1	4	1,066,379	544	36.9	79.9	73.9
Brea-Ontina.....	152	2,325,877	23,074	100.8	48.3	84.1	326	2,181,397	52,081	20.5	16.8	86.8
Coyote Hills.....	182	5,093,860	31,198	163.3	57.3	94.5	153	4,670,137	34,353	136.5	46.5	87.2
Domigues.....	59	2,650,001	9,502	276.9	33.1	89.5	58	2,438,138	9,801	126.3	58.6	91.5
El Segundo.....	567	6,126,295	28,007	64.5	46.5	92.7	566	5,768,086	96,353	59.9	49.2	91.8
Huntington Beach.....	203	2,821,407	28,007	100.7	61.0	76.1	205	2,514,312	28,135	89.4	64.6	74.6
Jungewood.....	6	14,407	1,039	13.6	46.1	97.5	6	12,628	1,075	11.7	44.9	97.4
Lawndale.....	1,250	10,289,899	218,217	47.2	77.3	96.5	1,255	10,016,208	222,997	44.9	78.8	96.6
Long Beach.....	81	33,643	14,222	2.4	1.9	97.0	81	34,037	14,334	2.4	3.4	96.2
Los Angeles.....	212	1,632,247	32,183	51.6	114.5	83.7	211	2,501,396	32,576	76.8	119.5	83.9
Montebello.....	65	112,494	11,041	10.2	3.2	94.3	67	195,555	12,143	16.1	3.2	98.5
Playa del Rey.....	205	1,200,050	35,317	34.2	71.9	95.4	196	1,085,776	33,785	30.7	73.9	98.7
Potrero.....	11	85,950	1,796	47.9	66.5	90.2	12	137,029	2,121	64.6	66.4	96.1
Richfield.....	296	1,652,698	46,016	35.9	16.4	86.0	292	1,517,799	45,142	33.6	15.4	84.0
Rosemead.....	94	1,201,611	15,794	76.1	48.9	93.0	110	2,554,989	18,922	135.0	41.3	93.5
Salt Lake.....	8	44,242	1,363	32.5	111.7	94.1	8	42,358	1,375	30.8	103.7	93.4
Santa Fe Springs.....	655	6,835,336	110,201	62.0	91.2	93.0	600	5,766,338	100,083	57.6	102.7	90.7
Seal Beach.....	113	1,691,301	18,592	91.0	201.3	91.3	112	1,510,451	18,819	80.3	214.1	91.3
Torrance.....	519	1,710,482	86,220	19.8	7.9	91.7	611	3,372,574	101,173	33.3	8.0	90.0
Whittier.....	147	166,528	24,058	6.9	18.5	90.7	147	170,906	24,764	6.9	18.7	91.6
Wilmington.....	436	16,767,793	72,681	230.7	2.4	92.0	544	17,253,806	94,442	182.7	2.1	94.4
Los Angeles County.....	3	3,888	471	8.3	11.4	97.5	3	3,894	541	7.2	10.9	98.0
San Bernardino County.....	1	896	164	5.5	1.3	90.6	1	895	92	9.7	0.1	50.0
Totals.....	5,592	63,605,720	928,410	68.5	55.2	91.7	5,771	63,608,640	969,396	65.6	54.5	91.3
Distr. 2—Bardsdale.....	136	217,008	20,815	10.4	2.4	84.6	135	223,636	21,396	10.5	2.2	86.1
Conejo.....	0	0	0	0	0	0	9	90	54	1.7	16.7	3.3
Ojai.....	57	28,340	3,208	3.2	3.1	86.3	58	31,397	9,331	3.4	2.7	87.4
Piru.....	93	194,452	14,958	13.0	13.1	88.9	92	184,455	15,166	12.2	13.0	89.6
Rincon.....	58	1,277,259	9,529	134.0	22.1	90.8	67	1,157,824	10,792	107.3	21.8	87.5
Santa Paula.....	42	14,270	5,140	2.8	4.7	67.6	44	13,830	5,863	2.4	3.8	72.4
Sespe.....	21	46,620	2,815	16.6	7.5	74.1	24	51,392	3,259	15.8	11.1	73.8
Simi.....	56	18,816	8,810	2.1	0.4	86.9	56	17,599	8,853	2.0	0.4	85.9
South Mountain.....	84	263,176	10,374	25.4	1.0	88.2	84	264,563	11,462	23.1	0.8	74.2
Ventura.....	261	6,605,658	37,779	174.9	29.8	80.0	247	6,322,457	37,467	168.7	28.9	82.4
Ventura County.....	2	28,502	337	84.6	4.9	93.1	2	17,568	368	47.8	1.7	100.0
Totals.....	810	8,635,151	119,465	72.8	14.0	81.5	818	8,284,811	124,011	66.8	13.4	82.4

MINERAL PRODUCTION OF CALIFORNIA

TABLE G. Production Statistics and Operating Data of California Oil Fields—1938—(Continued)

Field	January 1 to June 30					July 1 to December 31						
	Average number of producing wells—actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percent- age of time wells produced	Average number of producing wells— actual	Oil (bbls.)	Number of days producing	Production per well per day (bbls.)		Percent- age of time wells produced
				Oil	Water					Oil	Water	
DIST. 3—												
Arroyo Grande.....	45	19,035	2,278	8.4	1.2	83.9	15	19,577	2,167	9.0	1.7	78.7
Capitan.....	42	543,751	6,317	86.1	8.3	83.1	49	523,677	6,916	75.7	17.4	76.7
Casmalia.....	10	48,314	1,165	41.5	26.9	64.4	5	40,434	568	71.2	15.1	61.7
Cat Canyon.....	13	730,241	1,688	432.6	13.3	71.7	15	980,626	1,777	551.8	16.9	64.4
Elwood.....	79	1,284,056	13,922	92.2	185.0	97.4	75	964,251	12,512	77.1	186.5	90.7
La Goleta Gas.....	*2	0	0	0	0	0	0	0	0	0	0	0
Lompoc.....	7	53,578	847	63.3	119.8	66.9	5	36,982	622	59.5	144.6	67.6
Mesa.....	35	90,295	6,000	15.0	112.1	94.7	35	72,006	6,023	12.0	108.1	93.5
Santa Maria.....	127	448,424	19,770	22.7	28.1	86.0	120	413,261	18,849	21.9	29.3	85.4
Santa Maria Valley.....	93	1,643,855	9,825	167.3	2.4	58.4	90	1,669,445	9,032	184.8	2.4	54.5
Sargent.....	9	4,142	1,323	3.1	0	81.2	8	4,331	1,233	3.5	0	83.8
Summerland.....	7	5,965	1,168	5.1	26.6	92.2	7	5,894	1,239	4.6	15.1	96.2
San Mateo County— Half Moon Bay.....							2	1,462	276	5.3	0	75.0
Totals.....	437	4,871,656	64,303	75.8	63.2	81.3	426	4,732,036	61,214	77.3	62.6	78.1
DIST. 4—												
Belridge.....	188	2,817,257	31,117	90.5	22.5	91.4	175	2,474,117	29,421	84.1	16.8	91.4
Buena Vista Lake Gas.....	*1	0	0	0	0	0	0	0	0	0	0	0
Buttonwillow Gas.....	*8	0	0	0	0	0	0	0	0	0	0	0
Canal.....	5	266,221	702	379.2	5.5	77.6	12	579,089	2,016	287.2	5.7	91.3
Canfield Ranch.....	1	20,063	144	139.3	1.1	79.6	1	15,041	162	92.8	6.6	88.0
Devils Den.....	5	4,621	689	6.7	2.4	76.1	12	4,473	1,818	2.5	4.9	82.3
Elison.....	86	617,993	14,107	43.8	14.7	90.6	83	490,133	12,198	40.2	14.7	79.9
Elk Hills.....	175	1,976,628	29,356	67.3	96.6	92.7	170	1,900,904	29,051	65.4	97.3	92.9
Elk Hills.....	*0	0	0	0	0	0	0	0	0	0	0	0
Fruitvale.....	168	1,672,528	28,053	59.6	13.5	92.3	170	1,414,737	25,480	55.5	18.4	81.5
Greely.....	14	649,499	1,958	331.7	4.5	77.3	17	513,786	2,474	207.7	16.7	79.1
Kern River.....	1,412	2,220,092	23,656	9.3	33.0	93.4	1,419	1,957,324	239,508	8.2	33.1	91.7
Lost Hills.....	255	667,204	42,539	15.7	32.3	92.2	258	622,566	43,505	14.3	33.4	91.8
McKittrick-Tembler.....	222	672,287	35,630	18.9	89.8	88.7	200	606,260	32,702	18.5	92.9	88.9
Midway-Sunset.....	2,570	12,365,908	413,771	29.9	30.9	89.0	2,515	10,570,602	401,190	26.4	31.1	86.7
Midway-Sunset.....	*19	0	0	0	0	0	*20	0	0	0	0	0
Mt. Poso.....	272	3,503,492	43,266	81.0	161.3	87.9	253	2,747,454	40,384	68.0	159.4	86.8
Mountain View.....	183	2,256,468	30,390	74.3	30.0	91.7	175	1,744,406	27,453	63.5	30.0	85.3
Mountain View.....	*2	0	0	0	0	0	*2	0	0	0	0	0

PETROLEUM

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Poso Creek.....	61	288,134	9,013	29.1	25.4	89.8	65	242,365	9,866	24.6	31.5	82.5
Rio Bravo.....	4	480,250	642	748.1	6.0	88.7	19	1,462,073	3,144	465.0	6.2	89.9
Round Mountain.....	192	3,013,190	31,542	95.5	185.6	90.8	196	2,461,463	31,809	77.4	212.1	87.7
Semiotropic Gas.....	5	0	0	0	0	0	24	0	0	0	0	0
Ten Section.....	17	978,334	2,830	345.7	5.3	92.0	29	1,494,445	5,098	293.1	6.3	95.5
Trico Gas.....	40	0	0	0	0	0	40	0	0	0	0	0
Wasco.....	1	44,042	145	303.7	14.4	80.1	2	81,021	375	216.1	9.2	100.0
Wheeler Ridge.....	30	56,223	4,743	11.9	2.8	87.3	29	56,833	4,996	11.4	2.8	93.6
Kern County.....	4	46,093	574	80.3	8.1	79.3	6	44,887	784	57.3	14.6	71.0
Kern County.....	40	0	0	0	0	0	0	0	0	0	0	0
Tulare County.....	2	1,320	265	5.0	3.0	73.2	0	0	0	0	0	0
Totals.....	5,867	34,610,837	961,035	36.0	45.2	90.5	5,806	31,483,979	943,524	33.4	45.9	88.3
Dist. 5—Coalinga.....	844	2,130,916	129,361	16.5	16.9	84.7	726	1,517,230	118,381	12.8	16.6	88.6
East Coalinga Extension.....							5	247,110	532	464.5	2.1	57.8
Kettleman Middle Dome.....	3	11,981	542	22.1	148.9	99.8	3	1,555	549	13.8	160.9	99.5
Kettleman North Dome.....	191	13,997,489	30,325	461.6	57.7	87.7	206	11,589,652	33,686	344.0	60.6	88.9
McDonald Island Gas.....	4	0	0	0	0	0	5	0	0	0	0	0
Rio Vista Gas.....	16	0	0	0	0	0	16	0	0	0	0	0
Tracy Gas.....	4	0	0	0	0	0	3	0	0	0	0	0
Glenn County—Willows Area.....							40	0	0	0	0	0
Madera County—Chowchilla Area.....	40	0	0	0	0	0	40	0	0	0	0	0
Sutter County—Marysville.....	2	0	0	0	0	0	1	0	0	0	0	0
Buttes Area.....												
Yolo County—Fairfield.....	1	0	0	0	0	0	1	0	0	0	0	0
Knolls Area.....												
Totals.....	1,038	16,140,386	160,228	100.7	25.1	85.3	940	13,361,547	153,148	87.2	26.8	88.5
Grand totals.....	13,744	127,924,750	2,233,441	65.2	53.2	89.8	13,761	121,471,013	2,251,766	53.9	47.0	88.9

<sup>1</sup>Estimated.

<sup>2</sup>Gas wells omitted from totals.

## CHAPTER THREE

## METALS

*Bibliography:* Reports of State Mineralogist I-XXXV (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The total value of metals produced in California during 1938 was \$49,590,262. Chief among these is and always has been gold, followed by silver, copper, quicksilver, tungsten ore, lead, iron ore, platinum, and chromite.

A comparison of the 1937 output with that of the 1938 output is afforded by the following table:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Chromite.....	1,918 tons	\$20,830		*	
Copper.....	10,512,500 lbs.	1,272,013	1,613,491 lbs.	\$158,122	\$1,113,891—
Gold.....	1,174,578 fine ozs.	41,110,230	1,311,129 fine ozs.	45,889,515	4,779,285+
Iron ore.....	5,490 tons	29,340		*	
Lead.....	2,402,110 lbs.	141,724	1,003,096 lbs.	46,142	95,582—
Platinum group metals.....	530 ozs.	23,704	1,069 fine ozs.	35,150	11,446+
Quicksilver.....	9,985 flasks	837,789	12,171 flasks	846,497	8,708+
Silver.....	2,888,265 fine ozs.	2,234,073	2,590,804 fine ozs.	1,674,863	559,109—
Tungsten.....	611 tons	782,187	768 tons	786,860	4,673+
Zinc.....	39,643 lbs.	2,577	17,554 lbs.	843	1,734—
Unapportioned*				152,270	
Total values.....		\$46,454,467		\$49,590,262	
Net increase.....					\$3,135,795

\* Includes iron ore and chromite.

\* Included under 'Unapportioned.'

## ALUMINUM

*Bibliography:* Report XVIII, p. 198, XXXIV. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this state, being in Riverside County southeast of Corona, but as yet undeveloped.

## ANTIMONY

*Bibliography:* State Mineralogist Reports VIII, X, XII-XV (inc.), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI, XXXIV. Bulletins 38, 91.

During 1938 there were no shipments of antimony ore in California. The principal commercial production of antimony in California has come from Kern, Inyo and San Benito counties, and other occurrences have been noted in Nevada, Riverside, San Bernardino and Santa Clara counties. The commonest occurrence is in the form of the sulphide, stibnite; but in the Kernville and Havilah districts in Kern County there were notable deposits of the native metal, being among the few localities of the world where native antimony has been found.

Present New York quotations (June 29, 1939) are around 14¢ per pound for Chinese (duty paid) and 12¢ for domestic antimony.

**Antimony Production in California, by Years.**

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	75	\$15,500	1902.....		
1888.....	100	20,000	1915.....	510	\$35,666
1889.....			1916.....	1,015	64,793
1893.....	50	2,250	1917.....	158	18,786
1894.....	150	6,000	1918.....		
1895.....	33	1,485	1925.....		
1896.....	17	2,320	1926.....	*26	770
1897.....	20	3,500	1927.....	20	590
1898.....	40	1,200	1928.....	20	761
1899.....	75	13,500	1929.....		
1900.....	70	5,700			
1901.....	50	8,350	Totals.....	2,429	\$201,171

\* Annual details concealed under 'Unapportioned.'

**ARSENIC**

*Bibliography:* Reports XVIII, XXIII, XXV, XXX, XXXIII, XXXV. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite ( $\text{FeAsS}$ ), which is frequently gold bearing; and in scorodite ( $\text{FeAsO}_4 + 2\text{H}_2\text{O}$ ), an oxidation product of arsenopyrite. The occurrence of realgar ( $\text{AsS}$ ) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from California ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

**BERYLLIUM**

*Bibliography:* State Mineralogist Report XXVII, XXXV. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of beryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.

Present (June 29, 1939) quotations for beryllium ore are per ton in carload lots, minimum 10 per cent  $\text{BeO}$ , \$30; minimum 12 per cent  $\text{BeO}$ , \$35, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

#### BISMUTH

*Bibliography:* State Mineralogist Report XXXV. Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at \$2,400 in 1904, and credited to Riverside County.

The present quotation (June 29, 1939) for bismuth is \$1.10 per pound, in ton lots for the refined metal.

#### CADMIUM

*Bibliography:* U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from California ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

The present quotation (June 29, 1939) for cadmium is 50¢ per pound for the refined metal.

#### CHROMITE

*Bibliography:* State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXIV. Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During 1938 there were shipments of chromite or chromic iron ore in California from one deposit each in El Dorado, Fresno, and Placer counties, the annual details being concealed under the 'Unapportioned' item so as not to reveal the output of an operator. The 1938 production showed a decline in amount and value from that of 1937 which was 1,918 short tons, recalculated to a basis of 45%  $\text{Cr}_2\text{O}_3$ , valued at \$20,830 f.o.b. shipping point, coming from two properties in Del Norte County and one each in El Dorado, Fresno, Placer, Santa Barbara, and Tulare counties. The total shipments for 1937 were the largest since 1919.

**Occurrence.**

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as periodotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

**Imports.**

Imports of foreign chromite<sup>1</sup> to the United States duty free during 1938, came mainly from Southern Rhodesia, Union of South Africa, New Caledonia, Philippine Islands, Turkey, Greece, and India, totaled 352,085 long tons, valued at \$4,854,892 for 1938, compared with 553,916 long tons worth \$7,324,488 for 1937.

**Total Chromite Production of California.**

Production of chromite in California began, apparently, about 1874, principally in San Luis Obispo County. There was considerable activity from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons), valued at \$329,924, was shipped from that county up to the beginning of 1887. Some ore also was shipped from the Tyson properties in Del Norte County. The tabulation herewith shows the output of chromite in California, annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1874-1887 (San Luis Obispo County).....	26,028	\$329,924	1913.....	1,180	\$12,700
1887.....	3,000	40,000	1914.....	1,517	9,434
1888.....	1,500	20,000	1915.....	3,725	38,044
1889.....	2,000	30,000	1916.....	48,943	717,244
1890.....	3,599	53,985	1917.....	52,379	1,130,298
1891.....	1,372	21,580	1918.....	73,955	3,649,497
1892.....	1,500	22,500	1919.....	*4,314	97,164
1893.....	3,319	49,785	1920.....	1,770	43,031
1894.....	3,680	39,980	1921.....	347	6,870
1895.....	1,740	16,795	1922.....	379	6,334
1896.....	786	7,775	1923.....	84	1,658
1897.....	-----	-----	1924.....	350	6,700
1898.....	-----	-----	1925.....	191	3,712
1899.....	-----	-----	1926.....	393	7,063
1900.....	140	1,400	1927.....	225	5,063
1901.....	130	1,950	1928.....	729	15,179
1902.....	315	4,725	1929.....	327	5,025
1903.....	150	2,250	1930.....	84	1,905
1904.....	123	1,845	1931.....	441	6,737
1905.....	40	600	1932) <sup>a</sup> .....	1,206	16,587
1906.....	317	2,859	1933).....	294	3,498
1907.....	302	6,040	1934.....	488	6,111
1908.....	350	6,195	1935.....	221	3,314
1909.....	436	5,309	1936.....	1,918	20,830
1910.....	749	9,707	1937.....	a	a
1911.....	935	14,197	1938.....	-----	-----
1912.....	1,270	11,260	Totals.....	249,243	\$6,514,209

\* Recalculated to 45% Cr<sub>2</sub>O<sub>3</sub> beginning with 1919.

<sup>a</sup> Included under 'Unapportioned.'

<sup>1</sup> U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary of Foreign Commerce to the United States, Dec., 1938.

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## COBALT

*Bibliography:* Report XIV, XXXIII, XXXIV. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I. C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (June 29, 1939) is around 97 to 99¢ at \$1.92 per pound for the refined metal.

## COPPER

*Bibliography:* State Mineralogist Reports VIII-XXXV (inc.). Bulletins 23, 50, 91.

The total output of copper in California during 1938 amounted to 1,613,491 pounds recoverable metal valued at \$158,122. This was a decrease in amount and value compared with the 1937 production, which was 10,512,500 pounds worth \$1,272,013. The average price of copper in 1938 was 9.8¢ per pound compared with 12.1¢ in 1937; 9.2¢ in 1936; 8.3¢ in 1935; 8.0¢ in 1934; and 6.4¢ in 1935.

Copper was second to gold among the metals in California from 1896 to 1932, when it was passed in output by quicksilver and silver, and in 1933 also by tungsten, in 1936 and 1937 by silver only, and in 1938 by silver, quicksilver and tungsten.

Distribution of the 1938 output of copper in California by counties was as follows:

County	Pounds	Value
Amador.....	5,152	\$505
Calaveras.....	24,374	2,487
El Dorado.....	40,353	3,972
Imperial.....	70,000	6,860
Inyo.....	65,844	6,453
Los Angeles.....	2,128	209
Mariposa.....	4,328	424
Mono.....	3,050	299
Napa.....	4,450	436
Nevada.....	124,058	12,158
Placer.....	7,704	755
Plumas.....	1,202,974	117,891
Riverside.....	15,094	1,479
San Bernardino.....	24,723	2,423
San Diego.....	7,023	688
Tuolumne.....	2,899	284
Butte, Kern, Orange, Shasta, Sierra, Siskiyou*.....	8,155	799
Totals.....	1,613,491	158,122

\* Combined to conceal the output of individual producers in each.

According to preliminary data issued by the U. S. Bureau of Mines<sup>1</sup> the smelter production of primary copper from domestic sources during 1938 amounted to 1,124,656,559 pounds, a decrease of approximately 33 per cent compared with the 1937 output. The value decreased approximately 45 per cent in 1938. The average price of copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents, was 9.8¢ per pound.

<sup>1</sup> U. S. Bureau of Mines Mineral Market Report M. M. S. 754, March 23, 1939.



**Copper Production of California, by Years.**

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'<sup>1</sup> had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

**Copper Production of California, by Years**

Year	Pounds	Value	Year	Pounds	Value
1882.....	826,695	\$144,672	1911.....	36,838,024	\$4,604,753
1883.....	1,600,862	265,743	1912.....	34,169,997	5,638,049
1884.....	876,166	120,911	1913.....	34,471,118	5,343,023
1885.....	469,028	49,248	1914.....	30,491,535	4,055,375
1886.....	430,210	43,021	1915.....	40,968,966	7,169,567
1887.....	1,600,000	192,000	1916.....	55,809,019	13,729,017
1888.....	1,570,021	235,303	1917.....	48,534,611	13,249,948
1889.....	151,505	18,180	1918.....	47,793,046	11,805,883
1890.....	23,347	3,502	1919.....	22,162,605	4,122,246
1891.....	3,397,405	424,675	1920.....	12,947,299	2,382,303
1892.....	2,980,944	342,808	1921.....	12,088,053	1,559,358
1893.....	239,682	21,571	1922.....	22,833,987	3,090,582
1894.....	738,594	72,486	1923.....	28,346,860	4,166,989
1895.....	225,650	21,901	1924.....	52,089,349	6,823,704
1896.....	1,992,844	199,599	1925.....	46,968,499	6,669,527
1897.....	13,638,626	1,540,666	1926.....	33,521,544	4,693,014
1898.....	21,543,229	2,475,168	1927.....	27,350,316	3,582,888
1899.....	23,918,486	3,990,534	1928.....	25,162,304	3,623,360
1900.....	29,515,512	4,748,242	1929.....	33,809,258	5,941,799
1901.....	34,931,788	5,501,782	1930.....	26,534,752	3,449,522
1902.....	27,860,162	3,239,975	1931.....	12,954,842	1,178,890
1903.....	19,113,861	2,520,997	1932.....	1,417,536	89,307
1904.....	29,974,154	3,969,995	1933.....	992,515	63,521
1905.....	16,997,489	2,650,605	1934.....	590,638	47,252
1906.....	28,726,448	5,522,712	1935.....	2,031,836	168,645
1907.....	32,602,945	6,341,387	1936.....	9,991,799	919,245
1908.....	40,868,772	5,350,777	1937.....	10,512,500	1,272,013
1909.....	66,727,736	8,478,142	1938.....	1,613,491	158,122
1910.....	53,721,032	6,680,641			
			Totals.....	1,169,205,492	\$184,765,065

**GOLD**

**Bibliography:** State Mineralogist Reports I to XXXV (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of years in annual value by petroleum, and by natural gas from 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, includ-

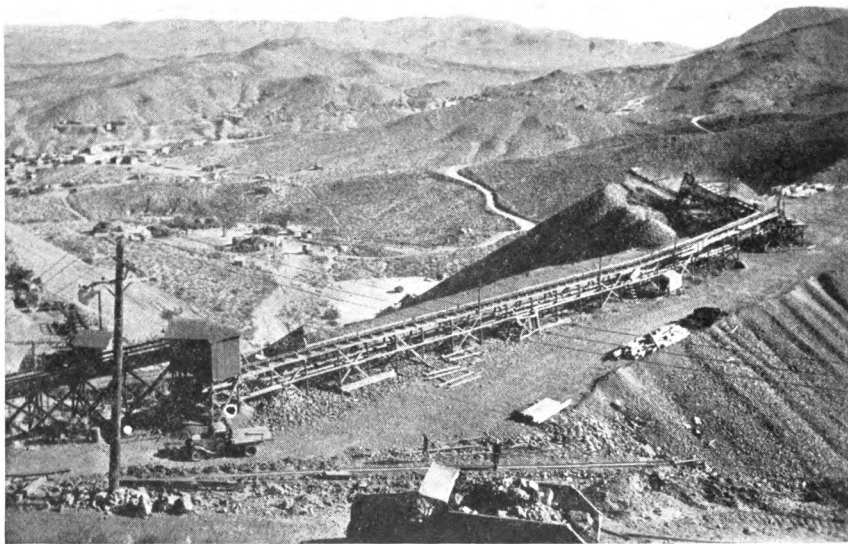
<sup>1</sup> Browne, J. Ross, Mineral Resources West of the Rocky Mountains, p. 168, 1867.

ing Alaska. In fact, at present, California is producing approximately 26% of the gold mined in the entire United States.

There has been a steady increase in the development of both lode and placer mines in California during the last ten years, brought about by the present economic conditions. During 1938 there were 1603 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers. There was no premium paid on gold during 1932, the price being \$20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January 30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became \$35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was \$34.95.

The production of gold in California during 1938 totaled 1,311,129 fine ounces valued at \$45,889,515, being an increase of 136,551 ounces over the 1937 yield. Deep or lode mines accounted for 738,616 fine ounces worth \$25,851,560, and placers (mainly bucket-line, drag-line and power-shovel dredges) produced 572,513 fine ounces worth \$20,037,955.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles



Conveyor belt for waste rock disposal at mill of Yellow Aster Mine, Kern County. Town of Randsburg in left-middle distance.

Photo by Walter W. Bradley

White Merrill and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.

The largest production of gold by counties in 1938 was reported by Nevada County with an output of 321,758 fine ounces (\$11,261,530); Sacramento County second with 142,104 fine ounces (\$4,973,640); Amador County third with 106,424 fine ounces (\$3,724,840); Kern County fourth with 86,703 fine ounces (\$3,034,605); Calaveras fifth with 83,035 fine ounces (\$2,906,225); followed in turn by Yuba, Merced, Butte, Placer, El Dorado, Trinity, Shasta, Siskiyou, and Mariposa counties, all with a total output worth in excess of a million dollars.

Nevada held the first place as a gold producing county with an output exceeding that of Yuba or Amador which held first and second places respectively in 1928 with Sacramento fourth that year. Sacramento was in second place, exceeding Amador County, which held this place in 1937. The gold from Nevada, Amador and Kern counties is mainly from the lode or dump mines; while that from Sacramento and Yuba counties is almost entirely from dredges and that from Calaveras County is about equally divided between lode mines and dredges.

Distribution for the 1938 gold output by counties was as follows:

County	Number of operators*		Fine ounces	Value
	Lode	Placer		
Alpine.....	1		1	\$35
Amador.....	43	28	106,424	3,724,840
Butte.....	18	38	53,782	1,882,370
Calaveras.....	55	50	83,085	2,906,225
Del Norte.....		3	20	700
El Dorado.....	71	33	42,423	1,484,805
Fresno.....	3	3	313	10,955
Humboldt.....	1	10	595	20,825
Imperial.....	15	4	12,814	448,490
Inyo.....	81	9	17,864	625,240
Kern.....	128	11	86,703	3,034,605
Los Angeles.....	12	10	4,906	171,710
Madera.....	14	14	271	9,485
Mariposa.....	70	17	30,909	1,081,815
Merced.....		5	59,724	2,090,340
Mono.....	20	1	3,354	117,390
Monterey.....	1	1	61	2,135
Napa.....	1		1,836	64,260
Nevada.....	30	29	321,758	11,261,530
Orange.....	1	1	7	245
Placer.....	26	67	51,599	1,805,965
Plumas.....	25	34	19,946	698,110
Riverside.....	25	5	2,200	77,000
Sacramento.....	2	15	142,104	4,973,640
San Bernardino.....	94	11	11,694	409,290
San Diego.....	5	3	88	3,080
San Francisco.....		▲	74	2,590
San Joaquin.....		2	1,188	41,580
Santa Clara.....	1		1	35
Santa Cruz.....		▲	10	350
Shasta.....	30	36	41,132	1,439,620
Sierra.....	20	38	25,728	900,480
Siskiyou.....	37	80	36,978	1,294,230
Stanislaus.....		6	12,950	453,250
Trinity.....	24	64	41,467	1,451,345
Tulare.....	5	2	40	1,400
Tuolumne.....	56	21	24,414	854,490
Ventura.....	1		19	665
Yuba.....	8	22	70,341	2,461,935
Lassen, Modoc, San Luis Obispo, Tehama**	3	3	2,356	82,460
Totals.....	927	676	1,311,129	\$45,889,515

\* Excludes itinerant prospectors, snipers, high-graders, and others who gave no evidence of legal right to property.

\*\* Combined in order not to disclose individual mine production.

▲ Not reported.

The following is quoted from the advance statement of gold in 1938 by courtesy of the U. S. Bureau of Mines,\* Department of Commerce:

"During the 10-year period ended with 1938, the value of the gold output of California increased 438 percent—from \$8,526,703 in 1929 to \$45,889,515 in 1938; the gain in 1938 over 1937 alone was equivalent to more than half the total value of the output in 1929. In quantity the 1938 gold output was greater than in any year since 1862, and in value it was greater than in any year since 1856. Gold production in 1938 exceeded that in 1937 by 12 per cent, whereas production in 1937 exceeded that in 1936 by only 9 per cent; this accelerating rate of increase is noteworthy in view of the upward trend that already has continued for 10 years.

"Although the data for gold production in California before 1901 do not segregate placer and lode gold it appears certain that the output of lode gold was larger in 1938 in both quantity and value than in any year in the history of the State. The quantity and value of placer gold produced are known to be higher in 1938 than in any year since 1900. Moreover, it is probable that the placer miners have not enjoyed so productive a year since unrestricted hydraulic mining flourished, over 50 years ago. Even better days for placer mining were anticipated when construction of large debris dams on rivers in the Sierra Nevada Mountains was begun under supervision of the California Debris Commission with River and Harbor Work funds. Early in 1939 the first debris dam, that on the North Fork of American River near Auburn, was completed, making practicable the reopening of a number of hydraulic mines in the large drainage basin above the dam. Another, the Upper Narrows Dam on Yuba River near Smartville, was projected for construction during 1939.

"The 25 leading gold properties, listed in the following table, produced 56 per cent of the total gold output of the State in 1938. Newcomers to the list in 1938 were three lode mines—the Cactus Queen, the Iron Mountain (which came just short of making the list in 1937), and the Sheepbranch—and four connected-bucket dredging properties—the Merced dredge No. 1 of the Merced Dredging Co., the Butte Unit of Yuba Consolidated Gold Fields, the San Joaquin dredge No. 1 of the San Joaquin Mining Co., and the Yreka dredge of the Yreka Gold Dredging Co. These operations replaced on the list four lode mines and three connected-bucket dredging properties that failed to maintain their rank among the leading 25 gold producers in 1938. It will be noted that 12 of the 25 leading in 1938 derived their gold from gold ores, 11 from gravels worked by connected-bucket dredges, and the remaining two from gold-silver ores; the producers ranking first, second, and sixth are in the Grass Valley-Nevada City district."

Twenty-five Leading Gold Producers in California in 1938, in Approximate Order of Output

Mine	District	County	Operator	Source of gold
Empire Star Mines	Grass Valley-Nevada City	Nevada	Empire Star Mines Co., Ltd.	Gold ore
Idaho Maryland	Grass Valley-Nevada City	Nevada	Idaho Maryland Mines Corp.	Gold ore
Natomas Co.	Folsom	Sacramento	Natomas Co.	Dredge
Yuba Unit	Yuba River	Yuba	Yuba Cons. Gold Fields	Dredge
Capital dredge	Folsom	Sacramento	Capital Dredging Co.	Dredge
Lava Cap.	Grass Valley-Nevada City	Nevada	Lava Cap Gold Mining Corp.	Gold ore
Central Eureka and Old Eureka	Mother Lode	Amador	Central Eureka Mining Co.	Gold ore
Carson Hill	Mother Lode	Calaveras	Carson Hill Gold Mining Corp.	Gold ore
Golden Queen	Mojave	Kern	Golden Queen Mining Co.	Gold ore
Merced Unit	Snelling	Merced	Yuba Cons. Gold Fields	Dredge
Cactus Queen	Mojave	Kern	Cactus Mines Co.	Gold-silver ore
Snelling Unit	Snelling	Merced	Snelling Gold Dredging Co.	Dredge
Iron Mountain	Iron Mountain	Shasta	The Mountain Copper Co., Ltd.	Gold ore
Merced dredge No. 1	Snelling	Merced	Merced Dredging Co.	Dredge
Yellow Aster	Randsburg	Kern	Anglo American Mining Corp., Ltd.	Gold ore
Sheepbranch	East Belt	Calaveras	St. Joseph Lead Co.	Gold ore
Argonaut	Mother Lode	Amador	Argonaut Mining Co., Ltd.	Gold ore
Sixteen to One	Alleghany	Sierra	Original Sixteen to One Mine, Inc.	Gold ore
Big Canyon	West Belt	El Dorado	The Mountain Copper Co., Ltd.	Gold ore
Arroyo Seco	Mother Lode	Amador	Arroyo Seco Gold Dredging Co.	Dredge
Starlight	Mojave	Kern	Lodestar Mining Co.	Gold-silver ore
Butte Unit	Oroville	Butte	Yuba Cons. Gold Fields	Dredge
San Joaquin dredge No. 1	Snelling	Merced	San Joaquin Mining Co.	Dredge
Cosumnes dredge	Cosumnes River	Sacramento	Cosumnes Gold Dredging Co.	Dredge
Yreka dredge	Greenhorn	Siskiyou	Yreka Gold Dredging Co.	Dredge

\* U. S. Bureau of Mines, Mineral Year Book, 1939, pp. 232-234.

**Total Gold Production of California.**

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,<sup>1</sup> and possibly 1820.<sup>2</sup> On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported<sup>3</sup> to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine, author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

<sup>1</sup> Hittell, T. H., *History of California*, Vol. II, p. 12, 1885.

<sup>2</sup> Bancroft, H. H., *History of California*, Vol. II, p. 417, 1886.

<sup>3</sup> *Mercantile Trust Review of the Pacific*, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

**Total Gold Production of California, 1848 to 1938**

Year	Fine ounces	Value	Year	Fine ounces	Value
1848	11,866	\$245,301	1895	741,798	\$15,334,317
1849	491,072	10,151,360	1896	831,158	17,181,562
1850	1,996,586	41,273,106	1897	767,779	15,871,401
1851	3,673,512	75,938,232	1898	769,476	15,906,478
1852	3,932,631	81,294,700	1899	741,881	15,336,031
1853	3,270,803	67,613,487	1900	767,390	15,863,355
1854	3,358,867	69,433,931	1901	821,845	16,989,044
1855	2,684,106	55,485,305	1902	818,037	16,910,320
1856	2,782,018	57,509,411	1903	788,544	16,300,653
1857	2,110,513	43,628,172	1904	901,484	18,633,676
1858	2,253,846	46,591,140	1905	914,217	18,898,545
1859	2,217,829	45,846,599	1906	906,182	18,732,452
1860	2,133,104	44,095,163	1907	809,214	16,727,928
1861	2,026,187	41,884,995	1908	907,590	18,761,559
1862	1,879,595	38,854,668	1909	979,007	20,237,870
1863	1,136,897	23,501,736	1910	953,734	19,715,440
1864	1,164,455	24,071,423	1911	954,870	19,738,908
1865	867,405	17,930,858	1912	953,640	19,713,478
1866	828,367	17,123,867	1913	987,187	20,406,958
1867	883,591	18,265,452	1914	999,113	20,653,496
1868	849,265	17,555,867	1915	1,085,646	22,442,296
1869	881,830	18,229,044	1916	1,035,745	21,410,741
1870	844,537	17,458,133	1917	971,733	20,087,504
1871	845,493	17,477,885	1918	799,588	16,528,953
1872	748,951	15,482,194	1919	807,667	16,695,955
1873	726,554	15,019,210	1920	692,297	14,311,043
1874	835,186	17,264,836	1921	759,721	15,704,822
1875	816,377	16,876,009	1922	709,678	14,670,346
1876	755,169	15,610,723	1923	647,210	13,379,013
1877	798,249	16,501,268	1924	636,140	13,150,175
1878	911,343	18,839,141	1925	632,035	13,065,330
1879	949,439	19,626,654	1926	576,798	11,923,481
1880	968,986	20,030,761	1927	564,586	11,671,018
1881	929,920	19,223,155	1928	521,740	10,785,315
1882	829,458	17,146,416	1929	412,479	8,526,703
1883	1,176,329	24,316,873	1930	457,200	9,451,162
1884	657,900	13,600,000	1931	523,135	10,814,162
1885	612,478	12,661,044	1932	569,167	11,765,726
1886	711,911	14,716,506	1933	<sup>a</sup> 613,579	15,683,075
1887	657,349	13,588,614	1934	<sup>b</sup> 719,064	25,131,284
1888	616,000	12,750,000	1935	<sup>c</sup> 890,430	31,165,050
1889	542,425	11,212,913	1936	1,077,442	37,710,470
1890	595,486	12,309,793	1937	1,174,578	41,110,230
1891	615,759	12,728,869	1938	1,311,129	45,889,515
1892	608,166	12,571,900			
1893	606,564	12,538,780			
1894	670,636	13,863,282	Totals	95,967,943	\$2,060,925,706

<sup>a</sup> Value calculated at an average weighted price of \$25.56 per fine ounce; previously \$20.6718.

<sup>b</sup> Value calculated at an average weighted price of \$34.95 per fine ounce.

<sup>c</sup> Value \$35 per fine ounce, beginning 1935.

## IRIDIUM (see under Platinum)

## IRON ORE

**Bibliography:** State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI, XXXIII-XXXV (inc.). Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

During 1938 shipments of iron ore were made in California coming from a single property each in Inyo, San Bernardino, and Santa Cruz County. The annual details are concealed under the 'Unapportioned' item so as not to reveal individual outputs. The 1938 output showed an increase in amount and value over that of 1937 which was 5,490 short tons worth \$29,340.

The material mined during the year was hematite from Inyo and San Bernardino counties, and magnetite sands from Santa Cruz County. The hematite was used mostly in high-iron cement with some going to foundaries as a flux. Use of magnetite is not known.

There was also some high-grade limonite mined in Yuba County, but as it was used in the manufacture of pigments, it has been classed under Mineral Paints.

There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

#### Iron Ore Production in California, by Years.

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881*	9,273	\$79,452	1918.....	3,108	\$15,047
1882.....	2,073	17,766	1919.....	2,300	13,796
1883.....	11,191	106,540	1920.....	5,975	40,889
1884.....	4,532	40,983	1921.....	1,970	12,030
1885.....			1922.....	3,588	18,868
1886.....	3,676	19,250	1923.....	3,102	18,665
1887.....			1924.....		
1893.....	250	2,000	1925/*.....	785	4,710
1894.....	200	1,500	1926.....		
1895.....			1927/*.....	5,272	26,000
1907.....	400	400	1928.....		
1908.....			1930.....		
1909.....	108	174	1931/*.....	100	700
1910.....	579	900	1932.....		
1911.....	558	558	1934.....		
1912.....	2,598	2,508	1935/*.....	38,339	163,714
1913.....	2,343	4,485	1936.....	31,084	155,434
1914.....	1,436	5,128	1937.....	5,490	29,340
1915.....	724	2,584	1938.....	a	a
1916.....	3,000	6,000			
1917.....	2,874	11,496	Totals.....	146,718	\$901,817

\* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hotelling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

a Annual details concealed under 'Unapportioned.'

**LEAD**

*Bibliography:* State Mineralogist Reports IV, VIII-XV (inc.), XVII-XXVIII (inc.), XXX, XXXI, XXXIII-XXXV (inc.).

The production of lead in California during 1938 amounted to a total of 1,003,096 pounds of recoverable metal valued at \$46,142 compared with the 1937-figures of 2,402,110 pounds worth \$141,724. The average price of lead in 1938 was 4.6¢ per pound compared with 5.9¢ per pound in 1937, 4.6¢ in 1936; 4.0¢ in 1935; 3.7¢ in 1934; and 3.7¢ in 1933.

Distribution of the 1938 output of lead by counties was as follows:

County	Pounds	Value
Calaveras.....	1,583	\$73
El Dorado.....	2,824	130
Inyo.....	322,004	14,812
Kern.....	6,994	322
Mono.....	6,039	278
Nevada.....	286,396	13,174
Orange.....	2,101	97
Placer.....	15,300	704
Plumas.....	2,276	105
Riverside.....	241,510	11,109
San Bernardino.....	88,888	4,089
Shasta.....	1,346	62
Sierra.....	17,608	810
Amador, Butte, Los Angeles, Mariposa, Siskiyou, Tuolumne*.....	8,227	377
Totals.....	1,003,096	\$46,142

\* Combined to conceal the output of individual operators in each.

**Lead Production of the United States.**

According to preliminary data issued by the U. S. Bureau of Mines<sup>1</sup> during 1938 the production of primary lead in the United States was 331,964 short tons, valued at \$30,541,000 being a decrease from the national production of 1937 which was 443,142 short tons worth \$52,291,000.

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Notes 742, May 8, 1939.



**Lead Production of California, by Years.**

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

**Lead Production of California, by Years**

Year	Pounds	Value	Year	Pounds	Value
1877	*7,836,000	\$391,800	1909	2,685,477	\$144,897
1878	8,640,000	325,320	1910	3,016,902	134,082
1879	4,502,000	191,335	1911	1,403,839	63,173
1880	4,200,000	215,460	1912	1,370,067	61,653
1881	6,680,000	325,316	1913	3,640,951	160,202
1882	b4,000,000	196,800	1914	4,697,400	183,198
1883	*3,400,000	145,520	1915	4,796,299	225,426
1884	3,200,000	120,512	1916	12,392,031	855,049
1885	2,000,000	80,900	1917	21,651,352	1,862,016
1886	2,000,000	93,400	1918	13,464,869	956,006
1887	d1,160,000	52,200	1919	4,139,562	219,397
1888	900,000	38,250	1920	4,903,738	392,300
1889	940,000	35,720	1921	1,149,051	51,707
1890	800,000	36,000	1922	6,511,280	358,120
1891	1,140,000	49,020	1923	9,934,522	695,416
1892	1,360,000	54,400	1924	4,984,387	398,751
1893	666,000	24,975	1925	7,352,422	639,661
1894	950,000	28,500	1926	8,067,873	645,429
1895	1,592,400	49,364	1927	2,748,440	173,151
1896	1,293,500	38,805	1928	1,882,795	109,102
1897	596,000	20,264	1929	1,428,777	90,014
1898	655,000	23,907	1930	3,542,796	176,241
1899	721,000	30,642	1931	3,934,240	145,568
1900	1,040,000	41,600	1932	2,418,626	72,480
1901	720,500	28,820	1933	772,463	28,583
1902	349,440	12,230	1934	804,911	29,655
1903	110,000	3,960	1935	1,142,405	45,695
1904	124,000	5,270	1936	1,098,545	50,533
1905	533,680	25,083	1937	2,402,110	141,724
1906	338,718	19,307	1938	1,003,096	46,142
1907	328,681	16,690			
1908	1,124,483	46,663	Totals	203,242,628	\$11,826,404

\* Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.

<sup>b</sup> Estimated.

<sup>c</sup> Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.

<sup>d</sup> Data from 1887 to date from reports of California State Mining Bureau.

**MANGANESE**

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVIII, XXII-XXVII (inc.), XXIX-XXXI, XXXIII-XXXV (inc.). Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

During 1938 there were no shipments of manganese ore reported in California. The material mined in 1935 came from a single property in Riverside County and was consumed in the steel mills of the State. The annual details are concealed under the 'Unapportioned' item as one operator made all the shipments.

Imports of foreign manganese ore into the United States<sup>1</sup> during 1938, mainly from Soviet Russia, Gold Coast, Cuba, and Brazil, amounted to 847,197 long tons of ore containing 402,578 tons of manganese valued at \$4,760,327, as compared with 974,281 long tons containing 464,638 long tons of manganese worth \$10,710,807.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore

<sup>1</sup> U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, Dec., 1938.

(including ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese.”

**Manganese Ore Production in California, by Years.**

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887.....	1,000	\$9,000	1912.....	22	\$400
1888.....	1,500	13,500	1913.....		
1889.....	53	901	1914.....	150	1,500
1890.....	386	3,176	1915.....	4,013	49,068
1891.....	705	3,830	1916.....	13,404	274,601
1892.....	300	3,000	1917.....	15,515	396,659
1893.....	270	4,050	1918.....	26,075	979,235
1894.....	523	5,512	1919.....	11,569	451,422
1895.....	880	8,200	1920.....	2,892	62,323
1896.....	518	3,415	1921.....	1,005	12,210
1897.....	504	4,080	1922.....	540	7,650
1898.....	440	2,102	1923.....	690	10,620
1899.....	295	3,165	1924.....	1,115	25,785
1900.....	131	1,310	1925.....	832	19,450
1901.....	425	4,405	1926.....	235	4,700
1902.....	870	7,140	1927.....		
1903.....	1	25	1928.....		
1904.....	60	900	1929.....	733	8,216
1905.....			1930.....		
1906.....	1	30	1931.....	207	2,576
1907.....	1	25	1932.....		
1908.....	321	5,785	1934.....	432	4,630
1909.....	3	75	1935.....		
1910.....	265	4,235	1936.....		
1911.....	2	40			
			Totals.....	88,883	\$2,398,976

\*Annual details concealed under 'Unapportioned.'

**MOLYBDENUM**

*Bibliography:* State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX, XXXIV, XXXV. Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese, nickel, tungsten and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses associated with copper sulphides. The first recorded commercial ship-

ments of molybdenum ore in California were during the war, 1916-1918. Some development work has been done on a high-grade deposit at the head of the Kaweah River, Tulare County.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present (June 29, 1939) quotations on molybdenum ores are 45¢ per pound of  $\text{MoS}_2$  contained, f.o.b. mine, and on ferromolybdenum are 95¢ per pound Mo, 55%-65% Mo f.o.b. shipping point.

During 1938 there was no production of molybdenum ore reported mined in California. In 1933 and 1934 there were shipments of molybdenum concentrates in California amounting to 1432 pounds 91.23%  $\text{MoS}_2$  valued at \$306. The annual details are combined under the 'Unapportioned' item to conceal the output of either operator.

#### Molybdenum Production of California, by Years.

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	Tons	Value
1916.....	8	\$9,945
1917.....	243	9,014
1918.....	*	300
1919.....		
1933\		
1934/ *	b	306
Totals.....	252	\$19,565

\* 300 pounds of 90%  $\text{MoS}_2$  concentrate.

\* Annual details concealed under 'Unapportioned.'

b 1432 pounds of 91.23%  $\text{MoS}_2$  concentrates.

#### NICKEL

*Bibliography:* State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX, XXXIV, XXXV. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (June 29, 1939) quotations for nickel are around 35¢ per pound for the refined metal.

**OSMIUM** (see under Platinum)

**PALLADIUM** (see under Platinum)

#### PLATINUM GROUP METALS

*Bibliography:* State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI. Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Merced, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

Platinum-group metals mined during 1938 amounted to 1194.40 ounces crude shipped and sold, containing 1069.36 fine ounces worth \$35,150. This metal came from properties in Butte, Calaveras, Merced, Humboldt, Nevada, Placer, Sacramento, Shasta, Siskiyou, Stanislaus, Tehama, Trinity, and Yuba counties. Of the above sold in 1938, 562.48 fine ounces were platinum; 145.43 fine ounces were iridium, 158.27 fine ounces were osmium; 139.02 fine ounces were osmiridium; and 64.16 fine ounces were a mixture of ruthenium, palladium, and rhodium. The 1937 output was 579 ounces crude containing 530 fine ounces worth \$23,704.

Present quotations <sup>1</sup> (June 29, 1939) are platinum \$35 a fine ounce; iridium 99 per cent plus, \$65; osmium per fine ounce \$48 to \$50; palladium per fine ounce \$24; ruthenium per fine ounce \$35 to \$40; rhodium per fine ounce \$120 to \$125.

#### Platinum Production of California, by Years.

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887	416	\$10,400	1914	463	\$14,816
1888	100	400	1915	667	21,149
1889	500	2,000	1916	886	42,642
1890	500	2,000	1917	610	43,719
1891	600	2,500	1918	571	42,788
1892	100	500	1919	*418	60,611
1893	80	440	1920	477	68,977
1894	75	517	1921	613	58,754
1895	100	600	1922	795	90,288
1896	150	900	1923	602	78,546
1897	162	944	1924	273	36,452
1898	150	900	1925	292	39,937
1899	300	1,800	1926	322	32,005
1900	300	1,800	1927	139	10,749
1901	400	2,500	1928	312	27,902
1902	250	3,200	1929	212	14,416
1903	39	468	1930	217	11,979
1904	70	1,052	1931	305	11,970
1905	123	1,849	1932	278	8,142
1906	200	3,320	1933	236	7,255
1907	91	1,647	1934	424	14,884
1908	300	6,255	1935	121	4,153
1909	706	13,414	1936	1,000	40,669
1910	337	8,386	1937	530	23,704
1911	511	14,873	1938	1,069	35,150
1912	603	19,731			
1913	368	17,738	Totals	19,357	\$961,521

\* Fine ounces, beginning with 1919.

#### QUICKSILVER

*Bibliography:* State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.), XXXI, XXXIII-XXXV (inc.). Bulletins 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines. Tech. Papers 96, 227; Bulletin 222, 335.

<sup>1</sup> E & M J Metal and Mineral Markets, June 29, 1939.

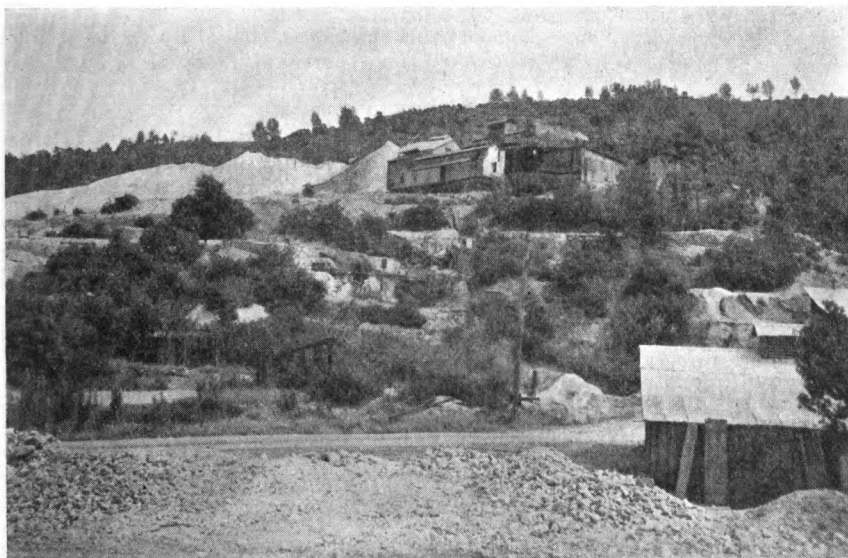
The production of quicksilver in California during the year 1938 was 12,171 flasks valued at \$846,497, compared with the 1937 output of 9,995 flasks worth \$837,789. The 1938 output came from 58 properties in 16 counties and distribution was as follows:

County	Flasks	Value
Lake.....	3,718	\$265,430
Napa.....	794	46,403
San Luis Obispo.....	1,114	77,938
Santa Barbara.....	104	7,179
Santa Clara.....	283	19,883
Sonoma.....	425	29,641
Contra Costa, Fresno, Inyo, Kern, Kings, Monterey, Orange, San Benito, Solano, Yolo*	5,833	400,023
Totals.....	12,171	\$846,497

\* Combined to conceal the output of individual operators.

During 1938 the average for New York monthly quotations <sup>1</sup> was \$75.469 per 76-pound flask. The average price for 1937 was \$90.180 per flask. The average price for January, 1938, was \$79.240 per flask, following which there was a decline in quotations until April when the average price for the month was \$71.019. The price then rose to a peak for the year in June of \$80.731, declining to October with an average of \$73.480, and ending the year with \$76.769. The average price received by producers in California during the year 1938 was \$69.55 per 76-pound flask, compared with \$83.82 in 1937.

The U. S. Bureau of Mines <sup>2</sup> reported the total production of the United States for 1938 at 17,991 flasks valued at \$1,357,781. The national production for 1937 was 16,508 flasks valued at \$1,488,691.



Furnace plant of Sulphur Bank Quicksilver Mine, Lake County.

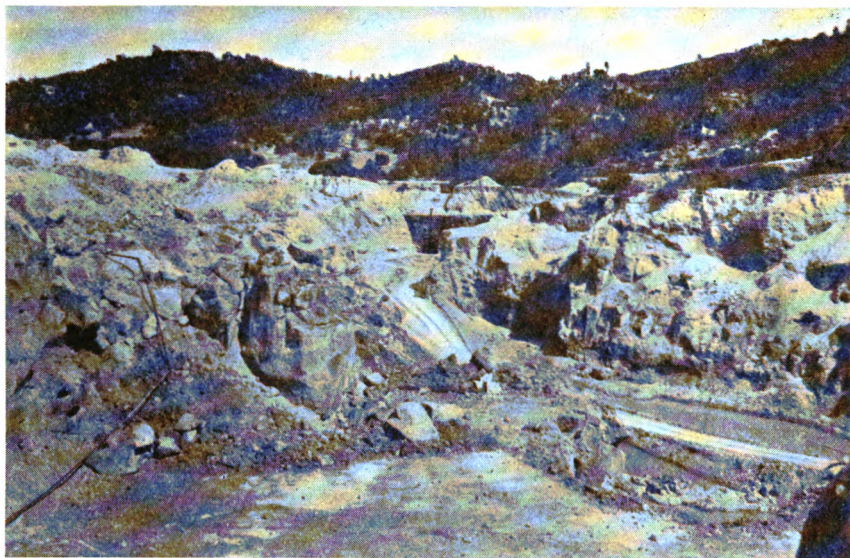
Photo by Walter W. Bradley

<sup>1</sup> Engineering and Mining Journal, 1938, Vol. 139.

<sup>2</sup> U. S. Bureau of Mines, Mineral Report 744, May 10, 1939.



California was by a considerable margin the largest producing state, with approximately 67 per cent of the total, other producing states being Oregon, Texas, Arkansas, Washington, Nevada, and Arizona. The 1938 imports of quicksilver amounted to 2,362 flasks valued at \$132,610 compared with 18,917 flasks valued at \$1,341,928 in 1937, a decrease of 91 per cent in value. Of total imports for 1938, Spain supplied 1,251 flasks and Italy 1,111 flasks.



Open-pit mining at Sulphur Bank Quicksilver Mine, Lake Co.

Photo by Walter W. Bradley

#### **Total Quicksilver Production of California.**

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and was in practically continuous operation from 1846 to 1921 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained  $76\frac{1}{2}$  pounds; then 75 pounds up to and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850-1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883-1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850.....	7,723	\$768,052	\$99 45	1896.....	30,765	\$1,075,449	\$34 96
1851.....	27,779	1,859,248	66 93	1897.....	26,691	993,445	37 28
1852.....	20,000	1,166,600	58 33	1898.....	31,092	1,188,628	38 23
1853.....	22,284	1,235,648	55 45	1899.....	29,454	1,405,045	47 70
1854.....	30,004	1,663,722	55 45	1900.....	26,317	1,182,786	44 94
1855.....	33,000	1,767,150	53 55	1901.....	26,720	1,285,014	48 46
1856.....	30,000	1,549,500	51 65	1902.....	29,552	1,276,524	43 20
1857.....	28,204	1,374,381	48 73	1903.....	32,094	1,335,954	42 25
1858.....	31,000	1,482,730	47 83	1904.....	28,876	1,086,323	37 62
1859.....	13,000	820,690	63 13	1905.....	24,555	886,081	35 94
1860.....	10,000	535,500	53 55	1906.....	19,516	712,334	36 50
1861.....	35,000	1,471,750	42 05	1907.....	17,379	663,178	38 16
1862.....	42,000	1,526,700	36 35	1908.....	18,039	763,520	42 33
1863.....	40,531	1,705,544	42 08	1909.....	16,217	773,798	47 71
1864.....	47,489	2,179,745	45 90	1910.....	17,665	799,092	45 23
1865.....	53,000	2,432,700	45 90	1911.....	19,109	879,205	46 01
1866.....	46,550	2,473,202	53 13	1912.....	20,600	866,024	42 04
1867.....	47,000	2,157,300	45 90	1913.....	15,661	630,042	40 23
1868.....	47,728	2,190,715	45 90	1914.....	11,373	557,846	49 05
1869.....	33,811	1,551,925	45 90	1915.....	14,199	1,157,449	81 52
1870.....	30,077	1,725,818	57 38	1916.....	21,427	2,003,425	93 50
1871.....	31,686	1,999,387	63 10	1917.....	24,382	2,396,466	98 29
1872.....	31,621	2,084,773	65 93	1918.....	22,621	2,579,472	114 03
1873.....	27,642	2,220,482	80 33	1919.....	15,200	1,353,381	89 04
1874.....	27,756	2,919,376	105 18	1920.....	10,278	775,527	75 45
1875.....	50,250	4,225,538	84 15	1921.....	3,157	140,666	44 56
1876.....	75,074	3,303,256	44 00	1922.....	3,466	191,851	55 35
1877.....	79,396	2,961,471	37 30	1923.....	5,458	332,851	60 98
1878.....	63,880	2,101,652	32 90	1924.....	7,948	543,080	68 33
1879.....	73,684	2,194,674	29 85	1925.....	7,683	621,831	80 81
1880.....	59,926	1,857,706	31 00	1926.....	5,892	516,382	87 64
1881.....	60,851	1,815,185	29 83	1927.....	6,488	714,418	111 67
1882.....	52,732	1,488,624	28 23	1928.....	7,107	844,649	118 84
1883.....	46,725	1,343,344	28 75	1929.....	10,152	1,195,705	117 78
1884.....	31,913	973,347	30 50	1930.....	11,374	1,255,257	110 36
1885.....	32,073	986,245	30 75	1931.....	13,478	1,121,624	83 22
1886.....	29,981	1,064,326	35 50	1932.....	5,349	279,780	52 30
1887.....	33,760	1,430,749	42 38	1933.....	4,102	229,472	55 94
1888.....	33,250	1,413,125	42 50	1934.....	7,946	534,135	67 22
1889.....	26,464	1,190,880	45 00	1935.....	9,353	628,590	67 23
1890.....	22,926	1,203,615	52 50	1936.....	8,758	671,055	76 62
1891.....	22,904	1,036,406	45 25	1937.....	9,995	837,789	83 82
1892.....	27,993	1,139,595	40 71	1938.....	12,171	846,497	69 55
1893.....	30,164	1,108,527	36 75				
1894.....	30,416	934,000	30 70				
1895.....	36,104	1,337,131	37 04				
				Totals.....	2,405,110	\$118,106,572	-----

\* Flasks of 75 lbs. from June, 1904; of 76½ lbs. previously.

b Flasks of 76 pounds, from January, 1928.

## SILVER

*Bibliography:* State Mineralogist Reports IV, VIII, XII-XXXIV (inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1938 silver output in California totaled 2,590,804 fine ounces valued at \$1,674,863, being an increase in both amount and value over the figures of the previous year which were 2,888,265 fine ounces worth \$2,234,073. Of the 1938 yield, there was 49,788 fine ounces worth \$32,186 from placers. The average price paid for newly mined domestic silver was 64.60¢ per fine ounce in 1938; 77.35¢ in 1937; 77.45¢ in 1936; 71.875¢ in 1935; and 64.6¢ in 1934.

Silver production by counties for 1938 was as follows:

County	Ounces	Value
Alpine.....	167	\$108
Amador.....	22,536	14,569
Butte.....	30,425	19,669
Calaveras.....	17,651	11,411
Del Norte.....	2	1
El Dorado.....	8,844	4,717
Fresno.....	54	35
Humboldt.....	89	58
Imperial.....	4,331	2,800
Inyo.....	41,118	26,581
Kern.....	1,148,177	742,256
Los Angeles.....	1,887	1,220
Madera.....	86	56
Mariposa.....	7,973	5,154
Merced.....	5,859	3,788
Mono.....	220,978	142,854
Monterey.....	5	3
Napa.....	148,337	95,895
Nevada.....	505,156	326,565
Orange.....	682	441
Placer.....	43,226	27,944
Plumas.....	53,927	34,862
Riverside.....	5,238	3,387
Sacramento.....	6,236	4,031
San Bernardino.....	257,370	166,381
San Diego.....	31	20
San Francisco.....	5	3
San Joaquin.....	92	59
Santa Clara.....	1	1
Santa Cruz.....	2	1
Shasta.....	28,771	18,599
Sierra.....	4,809	3,109
Siskiyou.....	5,159	3,335
Stanislaus.....	1,332	861
Trinity.....	4,628	2,992
Tulare.....	19	12
Tuolumne.....	7,029	4,544
Ventura.....	5	3
Yuba.....	8,349	5,397
Lassen, Modoc, San Luis Obispo, Tehama*	218	141
<b>Totals.....</b>	<b>2,590,804</b>	<b>\$1,674,863</b>

\* Combined in order not to disclose individual mine production.

The following paragraph is quoted from the U. S. Bureau of Mines,<sup>1</sup> chapter on Gold and Silver from Mineral Year Book 1939, by courtesy of Charles White Merrill and H. M. Gaylord.

"The bulk of the silver output of California in 1938 was more localized than that of the gold; the 10 leading properties, listed in the following table produced 82 per cent of the total silver. Newcomers to the list in 1938 were the Standard mine at Bodie (Mono County) and the Idaho Maryland mine at Grass Valley (Nevada County), which displaced on the list the Walker mine (Plumas County) and the Spanish mine (Nevada County). Of the 10 leaders, five produced gold-silver ores, four gold ores, and only one straight silver ore. In addition to the yield by the companies listed, some output of silver was reported from almost every lode and placer mine producing in the State in 1938."

<sup>1</sup> U. S. Bureau of Mines, Mineral Year Book 1939, p. 234.



Ten Leading Silver Producers in California in 1938, in Approximate Order of Output

Mine	District	County	Operator	Source of silver
Cactus Queen.....	Mojave	Kern.....	Cactus Mines Co.....	Gold-silver ore
Lava Cap.....	Grass Valley-Nevada City	Nevada.....	Lava Cap Gold Mining Corp....	Gold ore
Starlight.....	Mojave	Kern.....	Lodestar Mining Co.....	Gold-silver ore
Kelly.....	Randsburg	San Bernardino.....	Frank Royer.....	Gold-silver ore
Golden Queen.....	Mojave	Kern.....	Golden Queen Mining Co.....	Gold ore
Grigsby (Palisade).....	Calistoga	Napa.....	Graham Loftus Oil Corp.....	Gold-silver ore
Silverado-Kentuck.....	Mount Patterson	Mono.....	Sierra Cons. Mines, Inc.....	Silver ore
Empire Star.....	Grass Valley-Nevada City	Nevada.....	Empire Star Mines Co., Ltd.....	Gold ore
Standard.....	Bodie	Mono.....	Roseklip Mines Co.....	Gold-silver ore
Idaho Maryland.....	Grass Valley-Nevada City	Nevada.....	Idaho Maryland Mines Corp....	Gold ore

**Silver Production of California, by Years.**

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880-1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880-1896 (inc.) were based on 'coinage value' (\$1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successor, the U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880.....	882,169	\$1,014,494	\$1 15	1911.....	1,270,445	\$673,336	\$0 53
1881.....	580,091	655,503	1 13	1912.....	1,300,136	799,584	615
1882.....	653,569	745,069	1 14	1913.....	1,378,399	832,553	604
1883.....	1,129,244	1,253,461	1 11	1914.....	1,471,859	813,938	553
1884.....	3,236,987	3,593,056	1 11	1915.....	1,678,756	851,129	507
1885.....	1,968,260	2,125,298	1 07	1916.....	2,564,354	1,687,346	658
1886.....	1,245,747	1,233,290	99	1917.....	1,775,431	1,462,955	824
1887.....	1,262,282	1,237,036	98	1918.....	1,427,711	1,427,711	1 00
1888.....	1,314,574	1,235,982	94	1919.....	1,107,189	1,240,051	1 12
1889.....	823,947	774,510	94	1920.....	1,706,327	1,859,896	1 09
1890.....	820,336	861,353	1 05	1921.....	3,629,223	3,629,223	1 00
1891.....	737,224	729,852	99	1922.....	3,100,065	3,100,065	1 00
1892.....	358,575	311,960	87	1923.....	3,559,443	2,918,743	82
1893.....	415,468	324,065	78	1924.....	3,555,133	2,381,952	67
1894.....	229,896	144,834	63	1925.....	3,054,416	2,119,765	694
1895.....	463,911	301,542	65	1926.....	2,022,460	1,262,015	624
1896.....	326,757	222,195	68	1927.....	1,620,242	918,677	567
1897.....	754,648	452,789	60	1928.....	1,478,711	865,081	585
1898.....	701,788	414,055	59	1929.....	1,176,895	627,285	533
1899.....	855,569	513,521	60	1930.....	1,622,803	624,779	385
1900.....	1,168,157	724,257	62	1931.....	867,818	251,667	290
1901.....	950,831	570,499	60	1932.....	493,533	139,176	282
1902.....	1,163,041	616,412	53	1933.....	402,591	140,907	350
1903.....	958,230	517,444	54	1934.....	844,413	545,883	*644
1904.....	1,441,259	835,929	58	1935.....	1,191,112	856,112	*719
1905.....	1,076,174	650,009	61	1936.....	2,103,799	1,629,392	*775
1906.....	1,220,641	817,830	68	1937.....	2,888,265	2,234,073	*774
1907.....	1,138,856	751,646	66	1938.....	2,590,804	1,674,863	*646
1908.....	1,647,278	873,057	53				
1909.....	2,098,253	1,091,092	52				
1910.....	1,840,085	993,646	54	Totals.....	86,354,660	\$64,153,852	-----

\*Average price applied to newly mined within the United States.

TIN

*Bibliography:* Reports XV, XVII, XVIII, XXV, XXXI, XXXIV, XXXV. Bulletins 67, 91.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

Total Output of Tin in California

Year	Pounds	Value
1891.....	125,289	\$27,564
1892.....	126,000	32,400
1928}.....		
1929}.....	1,200	580
Totals.....	252,489	\$60,544

\*Annual details concealed under 'Unapportioned.'

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## TITANIUM

*Bibliography:* State Mineralogist's Report XXIII, XXXIII.

During 1938 the E. I. du Pont de Nemours did exploration work on the deposit of ilmenite in the San Gabriel Mountains in Los Angeles County to determine the extent of the deposit. They also ran an experimental test on the ores for commercializing it in the near future.

In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at \$150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The market price of titanium minerals varies as to the titanium oxide it contains. Present (Sept. 29, 1938) quotations are: Rutile 94% TiO at 10¢ a pound, ilmenite 45 to 52% TiO at \$10 to \$12 a ton, all prices Atlantic seaboard.

## TUNGSTEN

*Bibliography:* Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.) XXX, XXXIV, XXXV. Bulletins 38, 67, 91, 95, U. S. G. S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922 inclusive. The material shipped in 1938 was high-grade sorted ore and concentrates, coming from four properties each in Inyo and San Bernardino counties, and a single property each in Mono and Tulare counties. A total of 732 short tons of concentrates averaging 62.988% WO<sub>3</sub> was reported shipped, yielding 46,107 units, or 768 tons recalculated to 60% WO<sub>3</sub> and valued at \$786,860 at the mine. The 1938 output showed an increase in both quantity and value as compared with the 1937 which was 611 tons worth \$782,187. Quotations in "Metal and Mineral Markets" during 1938 for Chinese wolframite duty paid started the year at \$25 a unit WO<sub>3</sub>, decreasing in price to the first part of September when it was \$17 a unit WO<sub>3</sub>, then increased to the end of the year, at \$20 a unit WO<sub>3</sub>. Domestic scheelite started the year at \$22.625 a unit WO<sub>3</sub>; in May dropped to \$16 to \$17 a unit WO<sub>3</sub> and ended the year at from \$17 to \$19 a unit WO<sub>3</sub>. Present (June 29, 1939) prices per unit WO<sub>3</sub> at New York are: Chinese wolframite, duty paid, \$18; scheelite \$16 to \$17.

Imports of foreign tungsten ores and alloys in the United States during 1938, according to the U. S. Bureau of Foreign and Domestic Commerce, totaled 322,085 pounds valued at \$138,693, compared with 10,189,625 pounds worth \$2,940,038 in 1937. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hübnerite (manganese tungstate) also occur. The deposits at Atolia were the largest and most productive scheelite deposits known, previous to 1930.<sup>1</sup> (Since passed by Mill City District, Nevada).

#### Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60% WO<sub>3</sub>:

Year	Tons at 60% WO <sub>3</sub>	Value	Year	Tons at 60% WO <sub>3</sub>	Value
1905.....	57	\$18,800	1924.....	781	\$446,009
1906.....	485	189,100	1925.....	573	348,475
1907.....	287	12,587	1926.....	441	316,580
1908.....	105	37,750	1927.....	389	429,237
1909.....	577	190,500	1928.....	150	106,280
1910.....	457	278,245	1929.....	120	82,582
1911.....	387	127,706	1930.....	26	9,509
1912.....	572	276,000	1931.....	148	76,605
1913.....	559	234,673	1932.....	261	224,417
1914.....	420	180,575	1933.....	118	194,542
1915.....	962	1,005,467	1934.....	236	210,819
1916.....	2,270	4,571,521	1935.....	611	782,187
1917.....	2,466	3,079,013	1936.....	732	786,860
1918.....	1,932	2,832,222	1937.....		
1919.....	214	219,316	1938.....		
1920.....					
1923.....	34	19,126			
			Totals.....	16,429	\$17,254,579

\* Annual details concealed under 'Unapportioned.'

#### VANADIUM

*Bibliography:* Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

Present (June 29, 1939) New York quotations for ferrovanadium are \$2.70-\$2.90 per pound of vanadium f.o.b. works, and vanadium ore 27½¢ per pound V<sub>2</sub>O<sub>5</sub> contained.

<sup>1</sup> U. S. G. S. Bull. 652, p. 32.

## ZINC

*Bibliography:* State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX, XXXIII, XXXIV. Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1938 amounted to 17,554 pounds valued at \$843, compared with the 1937 output of 39,643 pounds worth \$2,577. The 1938 output came from San Bernardino County.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles, and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The production of metallic zinc<sup>1</sup> at reduction plants in the United States during 1938 amounted to 477,954 short tons valued at \$45,884,000, of which 10,334 tons was reduced from foreign ores and 31,613 tons from secondary metal. The 1938 output was a decrease over that of 1937, which was 608,458 short tons worth \$79,100.

The average price per pound for zinc in 1938 was 4.8¢ compared with 6.5 in 1937; 5¢ in 1936, 4¢ in 1935; and 4.3¢ in 1934.

#### Total Zinc Production of California.

Total figures for zinc output of the State are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906.....	206,000	\$12,566	1923.....		
1907.....	177,759	10,598	1924.....	3,080,000	\$198,900
1908.....	64,000	3,544	1925.....	11,546,602	877,542
1909.....			1926.....	20,447,559	1,533,568
1910.....			1927.....	8,625,004	552,000
1911.....	2,679,842	152,751	1928.....		
1912.....	4,331,391	298,866	1929.....		
1913.....	1,157,947	64,845	1931.....	149,865	5,314
1914.....	399,641	20,381	1932.....		
1915.....	13,043,411	1,617,383	1933.....	290,222	12,189
1916.....	15,950,565	2,137,375	1934.....	721,719	31,034
1917.....	11,854,804	1,209,190	1935.....	328,013	14,432
1918.....	5,565,516	506,466	1936.....	29,740	1,487
1919.....	1,384,192	101,046	1937.....	39,643	2,577
1920.....	1,188,009	96,229	1938.....	17,554	843
1921.....	846,184	42,309			
1922.....	3,034,430	172,963	Totals.....	107,129,660	\$9,676,398

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Report 720, March 30, 1939.

## CHAPTER FOUR

## STRUCTURAL MATERIALS

*Bibliography:* State Mineralogist Reports XII-XXXV (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1938 was valued at \$30,880,924 as compared with a total of \$37,976,626 for the year 1937. Materials grouped under this classification showing increased values in 1938 were bituminous rock and lime.

In 1938 all counties contributed to this structural total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification.

The following summary shows the value of the structural materials produced in California during the years 1937-1938, with increases or decreases in each instance:

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Brick and hollow building tile		\$3,083,902		\$2,594,546	\$489,356—
Cement	12,072,062 bbls.	16,546,229	10,561,037 bbls.	15,502,574	1,043,655—
Granite		207,738		131,386	76,352—
Lime	69,532 tons	681,277	70,078 tons	683,403	2,126 +
Marble*		23,667		6,015	17,652—
Sinistone		15,680		9,384	6,296—
Slate		32,572	6,871 tons	30,281	2,291—
Stone, miscellaneous		16,917,663		11,734,038	5,183,645—
Unapportioned		467,876		189,797	278,579—
Total values		\$37,976,624		\$30,880,924	
Net decrease					\$7,095,700

\* Includes onyx and travertine.

<sup>b</sup> Includes bituminous rock, magnesite, tube-mill pebbles.

<sup>c</sup> Includes bituminous rock, magnesite, paving blocks, serpentine, tube-mill pebbles.

## ASPHALT

*Bibliography:* State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself.

However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

### BITUMINOUS ROCK

*Bibliography:* State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI, XXXI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1938 shipments of bituminous rock were made from Santa Barbara and Santa Cruz counties with a single producer in each. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The total of the 1936 and 1937 yield was 36,128 short tons valued at \$139,242. The 1938 output showed an increase in both amount and value over that of 1937.

### Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887	36,000	\$160,000	1914	66,119	\$166,618
1888	50,000	257,000	1915	17,789	61,468
1889	40,000	170,000	1916	19,449	66,561
1890	40,000	170,000	1917	5,590	18,580
1891	39,962	154,164	1918	2,561	9,067
1892	24,000	72,000	1919	4,614	18,537
1893	32,000	102,036	1920	5,450	27,325
1894	31,214	115,193	1921	8,298	43,192
1895	38,921	121,586	1922	4,624	13,570
1896	49,456	122,500	1923	2,945	11,780
1897	45,470	128,173	1924	6,040	14,922
1898	46,836	137,575	1925	2,681	10,724
1899	40,321	116,097	1926	3,863	21,574
1900	25,306	71,495	1927	3,515	17,704
1901	24,052	66,354	1928	4,966	33,832
1902	33,490	43,411	1929	3,320	14,360
1903	21,944	53,106	1930	8,525	36,075
1904	45,280	175,680	1931		
1905	24,753	60,436	1932/*	23,653	109,140
1906	16,077	45,204	1933		
1907	24,122	72,835	1934/*	36,793	130,301
1908	30,718	109,818	1935		
1909	34,123	116,436	1936/*	41,681	133,344
1910	87,547	165,711	1937		
1911	75,125	117,279	1938/*	36,128	139,242
1912	44,073	87,467			
1913	37,541	78,479	Totals	1,346,935	\$4,278,454

\* Annual details concealed under 'Unapportioned.'

## BRICK AND HOLLOW TILE

*Bibliography:* State Mineralogist Reports VIII, X, XII-XV (inc.), XVII-XXVIII (inc.), XXXII. Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5-6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius.

We also include under this heading the various forms of hollow building 'tile' or blocks. The application of this tile to residence construction as well as to other structures has grown, though their total output for 1938 showed a decrease in value and tonnage as compared with the 1937 production.

The 1938 output of all kinds of brick in California showed a decrease in value of 18 per cent and a decrease in amount of 12 per cent as compared with that of 1937. The 1938 production consisted of 107,607 M. of common brick valued at \$1,148,756; 17,944 M. of fire brick valued at \$1,075,774; 3,722 M. of glazed, pressed fancy and vitrified paving-brick valued at \$146,289; and 16,592 tons of hollow building tile valued at \$223,827; which gave a total value for the year for brick and hollow building-tile of \$2,594,546. The 1937 output had a total value of \$3,083,902.

Los Angeles County had the largest production of brick and hollow building-tile in 1938 with 16 companies producing 54,152 M. of common brick worth \$571,095; 8,519 M. of Fire brick worth \$600,829; 784 M. of fancy, glazed and pressed brick worth \$34,168; and 3,022 tons of hollow building-tile worth \$31,141. Contra Costa County with three plants operating had a production of brick and hollow building-tile valued at \$483,961. Santa Clara with three plants, output of brick was valued at \$236,295. There were two operating plants each in Alameda, Orange, Kern, Sacramento, San Diego, San Joaquin, and Santa Barbara counties and one each in Amador, Fresno, Humboldt, Placer, Riverside, San Luis Obispo, San Bernardino, and Tulare counties. Included in the output of Alameda County was some face hollow building-tile.



**Brick and Hollow-Tile Production of California, by Years.**

Record of brick production in the state has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	Brick, M	Hollow building blocks, tons	Value
1893.....	103,900		\$801,750
1894.....	81,675		457,125
1895.....	131,772		672,360
1896.....	24,000		524,740
1897.....	97,468		563,240
1898.....	100,102		571,362
1899.....	125,950		754,730
1900.....	137,191		905,210
1901.....	130,766		860,488
1902.....	169,851		1,306,215
1903.....	214,403		1,999,546
1904.....	281,750		1,994,740
1905.....	286,618		2,273,786
1906.....	277,762		2,538,848
1907.....	362,167		3,438,951
1908.....	332,872		2,506,495
1909.....	333,846		3,059,929
1910.....	340,883		2,934,731
1911.....	327,474		2,638,121
1912.....	337,233		2,940,290
1913.....	358,754		2,915,350
1914.....	270,791		2,288,227
1915.....	180,538		1,678,756
1916.....	206,960		2,096,570
1917.....	192,269	29,348	2,532,721
1918.....	136,374	34,818	2,363,481
1919.....	156,328	36,026	3,087,067
1920.....	245,842	99,208	5,704,393
1921.....	238,022	67,100	5,570,875
1922.....	374,853	105,909	7,994,991
1923.....	397,754	122,534	9,738,082
1924.....	456,716	114,469	9,137,908
1925.....	361,094	105,491	7,503,976
1926.....	388,048	90,332	7,026,124
1927.....	374,111	75,116	6,516,077
1928.....	272,443	66,277	5,694,770
1929.....	327,011	66,713	5,607,410
1930.....	267,019	68,047	4,205,460
1931.....	151,545	51,988	2,560,415
1932.....	90,683	27,098	1,605,086
1933.....	76,905	25,814	1,520,481
1934.....	66,738	17,534	1,644,661
1935.....	76,521	21,309	1,855,343
1936.....	131,667	16,081	2,240,905
1937.....	148,833	17,521	3,083,902
1938.....	129,273	16,592	2,594,546
Totals.....	10 574,775	1,275,325	\$142,610,234

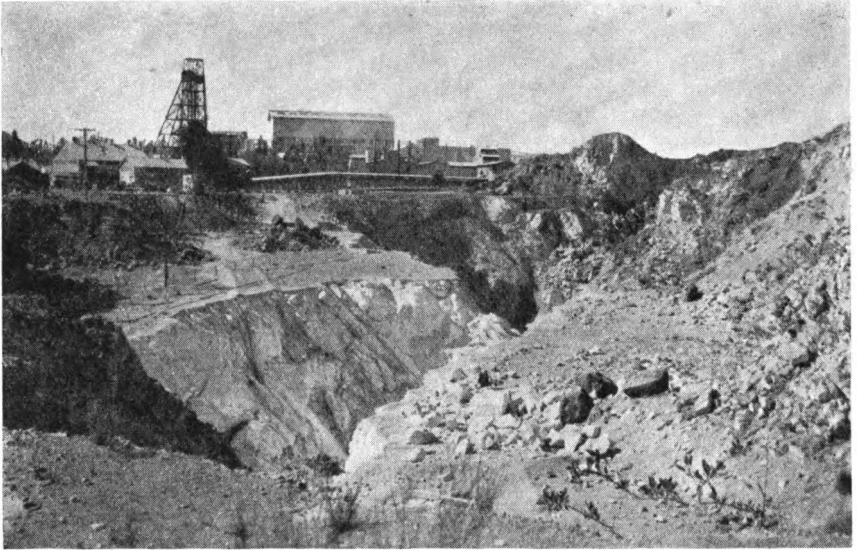
**CEMENT**

*Bibliography:* State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.), XXXII. Bulletin 38.

During 1938 there was a production of 10,561,037 barrels of cement in California, valued at \$15,502,574 f.o.b. plant, of which 4,015,467 barrels came from southern California plants, and 6,545,570 barrels came from northern California plants. The 1938 output was a decrease from that of 1937, which was 12,072,037 barrels worth \$16,546,229.

Shipments during 1938 were made from ten plants in nine counties to the extent 10,594,706 barrels valued at \$15,567,295, as compared with 11,721,818 barrels worth \$16,868,379. There were five plants in operation in northern California—one each in Calaveras, Contra Costa,

Merced, San Mateo, Santa Cruz counties, which shipped 4,006,067 barrels of cement; and five plants in southern California, two in San Bernardino County, and one each in Kern, Los Angeles<sup>1</sup> and Riverside counties, which shipped 6,588,639 barrels of cement. There were 1,993 men employed in the above plants during the year 1938.



Riverside Portland Cement Co. plant at Crestmore, Riverside County.

Photo by Walter W. Bradley

#### **Cement Production of California, by Years.**

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then \$4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to \$2.50 a barrel, about the same as it is today."<sup>2</sup>

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 annually exceeded the value of her gold output.

<sup>1</sup> The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

<sup>2</sup> Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

## Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891	5,000	\$15,000	1916	5,299,507	\$6,210,293
1892	5,000	15,000	1917	5,790,734	7,544,282
1893			1918	4,772,921	7,969,909
1894	8,000	21,600	1919	4,645,289	8,591,990
1895	16,383	32,556	1920	6,709,160	14,962,945
1896	9,500	28,250	1921	7,404,221	18,072,120
1897	18,000	66,000	1922	8,932,135	16,524,056
1898	50,000	150,000	1923	10,825,405	25,999,203
1899	67,000	180,000	1924	11,655,131	23,225,850
1900	52,000	121,000	1925	13,216,630	25,043,335
1901	71,800	159,842	1926	13,797,173	25,269,676
1902	171,000	423,600	1927	14,661,783	26,474,935
1903	640,868	968,727	1928	13,625,231	24,463,287
1904	969,538	1,539,807	1929	12,794,729	21,038,565
1905	1,265,553	1,791,916	1930	9,831,938	14,575,731
1906	1,286,000	1,941,250	1931	7,693,712	11,510,655
1907	1,613,563	2,585,577	1932	5,657,549	7,967,107
1908	1,629,615	2,359,692	1933	7,284,031	10,331,395
1909	3,779,205	4,969,437	1934	8,936,085	12,445,616
1910	5,453,193	7,455,715	1935	8,086,292	10,120,721
1911	6,371,369	9,765,625	1936	13,300,188	18,314,589
1912	6,198,634	6,074,661	1937	12,072,062	16,546,229
1913	6,167,806	7,743,024	1938	10,561,037	15,502,574
1914	5,109,218	6,558,148			
1915	4,918,275	6,044,950	Totals	263,442,463	\$429,066,432

## GRANITE

*Bibliography:* State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI, XXXV. Bulletin 38.

The 1938 output of granite in California amounted to 54,890 cu. ft. of building stone valued at \$66,391; 16,044 cu. ft. of monumental stone valued at \$45,933; 12,037 linear ft. of curbing valued at \$8,384; and 13,876 cu. ft. of unclassified material including a small amount of tuff and volcanic rock which was used as building stone, and for flag-stone, having a value of \$10,678; giving a total value for the year's yield at \$131,386. This was a decrease from the 1937 total value which was \$207,738. The 1938 output came from 21 quarries in 16 counties, of which there were two each in Fresno, Nevada, Placer, San Diego, and Sonoma counties and one each in Lassen, Los Angeles, Mariposa, Plumas, Riverside, Sacramento, San Bernardino, Santa Barbara, Shasta, Tuolumne, and Ventura counties.

The material from Los Angeles was a mica schist; that from Sonoma County a tuff and that from Shasta and Ventura counties a volcanic rock.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put. It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

**Varieties.**

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notable at

Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also similar 'black granite' in Tulare County, near Success.

**Granite Production of California, by Years.**

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887.....	\$150,000	1914.....	\$628,786
1888.....	57,000	1915.....	227,928
1889.....	1,329,018	1916.....	535,339
1890.....	1,200,000	1917.....	221,997
1891.....	1,300,000	1918.....	139,861
1892.....	1,000,000	1919.....	220,743
1893.....	531,322	1920.....	495,732
1894.....	228,816	1921.....	725,901
1895.....	224,329	1922.....	676,643
1896.....	201,004	1923.....	760,081
1897.....	188,024	1924.....	1,211,046
1898.....	147,732	1925.....	1,853,859
1899.....	141,070	1926.....	655,332
1900.....	295,772	1927.....	1,398,443
1901.....	519,285	1928.....	763,996
1902.....	255,239	1929.....	1,169,271
1903.....	678,670	1930.....	855,477
1904.....	467,472	1931.....	636,741
1905.....	353,837	1932.....	398,676
1906.....	344,083	1933.....	183,706
1907.....	373,376	1934.....	249,063
1908.....	512,923	1935.....	339,017
1909.....	376,834	1936.....	244,243
1910.....	417,898	1937.....	207,738
1911.....	355,742	1938.....	131,386
1912.....	362,975		
1913.....	981,277	Total.....	\$27,925,623

**LIME**

*Bibliography:* Reports XIV, XV, XVII-XXIX (inc.), XXXIII, Bulletin 38.

In California during 1938 there was an output of lime amounting to 70,578 short tons valued at \$683,403, coming from two plants each in El Dorado and San Bernardino counties and one each in Alameda, Santa Cruz and Tulare counties. The above figures showed an increase in both amount and value over those of 1937 which were 69,532 tons worth \$681,277.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not

separable. A portion is hydrated lime. Limestone utilized in sugar making, for smelter flux, as a fertilizer, and other special industrial uses, is classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

**Lime Production of California, by Years.**

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels,' as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.) :

Year	Tons	Value	Year	Tons	Value
1894.....	37,350	\$318,700	1918.....	43,684	\$461,315
1895.....	39,776	386,094	1919.....	42,070	552,043
1896.....	30,275	261,505	1920.....	46,314	557,232
1897.....	28,780	252,900	1921.....	46,353	610,619
1898.....	29,786	254,010	1922.....	57,875	671,747
1899.....	29,985	314,575	1923.....	70,894	788,834
1900.....	31,252	283,699	1924.....	62,029	703,355
1901.....	31,738	334,688	1925.....	61,922	685,528
1902.....	44,866	369,616	1926.....	63,568	670,837
1903.....	49,659	418,280	1927.....	60,498	631,497
1904.....	57,945	571,749	1928.....	56,616	547,919
1905.....	61,700	555,322	1929.....	42,834	417,101
1906.....	68,927	763,060	1930.....	47,662	452,084
1907.....	68,422	756,376	1931.....	36,189	360,523
1908.....	39,639	379,243	1932.....	27,510	254,223
1909.....	52,075	577,824	1933.....	33,425	271,619
1910.....	47,951	477,683	1934.....	32,500	309,765
1911.....	42,959	390,988	1935.....	59,731	573,212
1912.....	52,212	464,440	1936.....	64,275	633,678
1913.....	61,344	528,547	1937.....	69,532	681,277
1914.....	43,996	378,663	1938.....	70,578	683,403
1915.....	35,653	286,304			
1916.....	49,364	390,475			
1917.....	50,073	311,380	Totals.....	2,181,886	\$21,543,932

## MAGNESITE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1938 came from a single property each in Santa Clara and Stanislaus counties, both being operated by the same company. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of this single operator. Practically all was shipped in the calcined form.

The output for 1938 showed a decrease in both quantity and value from that of 1937. The 1936-1937 production showed a total of 94,491 short tons of crude magnesite valued at \$734,443, of which only a small amount was sold as such. Most of this material was calcined. The operators' reports showed that a total of 39,364 short tons of calcined material valued at \$1,016,843 rail-shipping point, was made during 1936-1937 and was both dead-burned and periclase for refractories, and material for the plastic trade. From two to two and one-half tons of crude material are required to make one ton of calcined. The average price of crude magnesite reported in 1938 was \$7.43 per ton, compared with \$8.25 per ton in 1937, \$7.25 per ton in 1936, \$6.70 per ton in 1935, \$6.50 per ton in 1934, \$5.60 per ton in 1933, and \$10.00 per ton in 1932.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property. Beginning in 1938, a portion of the market for calcined magnesite is being supplied by magnesium oxide produced from salt-works bitterns at a plant at Newark, Alameda County, on San Francisco Bay. The figures for this tonnage are included under those for magnesium salts in the Salines chapter.

**Imports.**

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick ¾¢ per lb., and 10 per cent ad valorem. The figures of imports for 1938, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 26,479 short tons valued at \$376,397 as compared with 58,853 tons worth \$857,780 in 1937.

**Total Magnesite Production of California.**

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,<sup>1</sup> southeast of Livermore, Alameda County. Shipments amounting to 'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

**Total Magnesite Production of California**

Year	Tons	Value	Year	Tons	Value
1887	600	\$9,000	1914	11,438	\$114,380
1888	600	9,000	1915	30,271	283,461
1889	600	9,000	1916	154,052	1,311,893
1890	600	9,000	1917	209,648	1,976,227
1891	1,500	15,000	1918	83,974	803,492
1892	1,500	15,000	1919	44,896	452,094
1893	1,093	10,930	1920	83,695	1,033,491
1894	1,440	10,240	1921	47,837	511,102
1895	2,200	17,000	1922	55,637	594,665
1896	1,500	11,000	1923	73,963	946,643
1897	1,143	13,871	1924	67,236	900,183
1898	1,263	19,075	1925	64,623	872,944
1899	1,280	18,480	1926	50,915	587,642
1900	2,252	19,333	1927	46,093	577,887
1901	4,726	43,057	1928	45,645	501,590
1902	2,830	20,655	1929	47,269	488,014
1903	1,361	20,515	1930	38,681	388,472
1904	2,850	9,298	1931	21,576	182,283
1905	3,933	16,221	1932	40,303	282,325
1906	4,032	40,320	1933		
1907	6,405	57,720	1934		
1908	10,582	80,822	1935	62,509	413,228
1909	7,942	62,588	1936		
1910	16,570	113,887	1937	94,491	734,443
1911	8,858	67,430	1938	*	*
1912	10,512	105,120			
1913	9,632	77,056			
			Totals	1,482,806	\$14,856,877

\* Combined under 'Unapportioned.'

**MARBLE**

**Bibliography:** State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.), XXXV. Bulletin 38. U. S. Bur. of Mines Bull. 106.

The 1938 production of marble in California was valued at \$6,015 (including some onyx and travertine from San Bernardino County, and a small amount of limestone used as building stone and flagstone coming from a single operator each in Los Angeles, San Luis Obispo, and Santa Barbara counties). The 1938 output showed a decrease in value from that of 1937 which was \$23,667.

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

<sup>1</sup> See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.

Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		\$5,000	1914	25,438	\$48,832
1888		5,000	1915	22,186	41,518
1889		87,030	1916	25,954	50,280
1890		80,000	1917	24,755	62,950
1891		100,000	1918	<sup>a</sup> 17,428	49,898
1892		115,000	1919	25,020	74,482
1893		40,000	1920	<sup>b</sup> 29,531	92,899
1894	38,441	98,326	1921	30,232	98,395
1895	14,864	56,566	1922	38,321	127,792
1896	7,889	32,415	1923	28,015	124,919
1897	4,102	7,280	1924	<sup>b</sup> 61,579	140,253
1898	8,050	23,594	1925	35,664	116,105
1899	9,682	10,550	1926	34,806	119,999
1900	4,103	5,891	1927	<sup>b</sup> 42,308	103,689
1901	2,945	4,630	1928	<sup>b</sup> 34,324	82,190
1902	19,305	37,616	1929	<sup>b</sup> 72,581	93,661
1903	84,624	97,354	1930	<sup>b</sup> 65,775	82,194
1904	55,401	94,208	1931	<sup>b</sup> 37,776	81,780
1905	73,303	129,450	1932	<sup>b</sup> 25,506	42,505
1906	31,400	75,800	1933	<sup>b</sup> 9,039	23,178
1907	37,512	118,066	1934	<sup>b</sup> 7,185	10,759
1908	18,653	47,665	1935	(b)	9,884
1909	79,600	238,400	1936	(b)	23,011
1910	18,960	50,200	1937	(b)	23,667
1911	20,201	54,103	1938	(b)	6,015
1912	27,820	74,120			
1913	41,654	113,282	Total.....		\$3,532,381

<sup>a</sup> Includes onyx and serpentine.  
<sup>b</sup> Includes onyx and travertine.

ONYX and TRAVERTINE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI, XXXIV. Bulletin 38.

Onyx and travertine are known to exist in an number of places in California, but there has been only a small and irregular production since the year 1896. In 1938 there were two producers of onyx in San Bernardino County. The 1938 output showed a decrease in both quantity and value from that of 1937, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen sets, and other ornamental purposes.

Onyx Production of California, by Years.

Production by years has been as follows:

Year	Value	Year	Value
1887	*	1924	*
1888	\$900	1925	\$16,120
1889	900	1926	7,575
1890	900	1927	*
1891	1,500	1928	*
1892	2,400	1929	*
1893	1,800	1930	*
1894	27,000	1931	*
1895	20,000	1932	*
1896	12,000	1933	*
1918	24,000	1934	*
1919	*	1935	*
1920		1936	*
1921	1,294	1937	*
1922	3,320	1938	*
1923	2,510		
		Total value.....	\$122,219

\* See under Marble.

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## SANDSTONE

*Bibliography:* State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1938 a total of 43,107 cu. ft. of sandstone valued at \$9,384 was quarried in California, and came from two properties in Monterey County and one each in Los Angeles, San Luis Obispo, and Shasta counties.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

#### Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887.....		\$175,000	1914.....	111,691	\$45,322
1888.....		150,000	1915.....	63,350	8,438
1889.....		175,598	1916.....	17,270	10,271
1890.....		100,000	1917.....	31,090	7,074
1891.....		100,000	1918.....	900	400
1892.....		50,000	1919.....	5,400	3,720
1893.....		26,314	1920.....	10,500	2,300
1894.....		113,592	1921.....	10,150	2,112
1895.....		35,373	1922.....	900	1,100
1896.....		28,379	1923.....	7,000	13,000
1897.....		24,086	1924.....	6,700	3,600
1898.....		46,384	1925.....	14,704	14,362
1899.....	56,264	103,384	1926.....	34,100	17,500
1900.....	378,468	254,140	1927.....	222,900	205,400
1901.....	266,741	192,132	1928.....	134,100	43,250
1902.....	212,123	142,506	1929.....	177,655	49,881
1903.....	253,002	585,309	1930.....	160,704	56,404
1904.....	363,487	567,181	1931.....	110,244	30,960
1905.....	302,813	483,268	1932.....	41,793	13,286
1906.....	182,076	164,068	1933.....	25,980	10,888
1907.....	159,573	148,148	1934.....	21,738	14,245
1908.....	93,301	55,151	1935.....	38,426	9,268
1909.....	79,240	37,032	1936.....	24,705	9,180
1910.....	165,971	80,443	1937.....	73,190	15,680
1911.....	255,313	127,314	1938.....	43,107	9,384
1912.....	68,487	22,574			
1913.....	62,227	27,870	Total value.....		\$4,612,171

## SERPENTINE

*Bibliography:* State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switchboards. As there was but a single operator, the figures were combined with those of marble output for those years.

The production of serpentine prior to 1919 was 'verde antique' which is used as an ornamental stone and often classed as a marble. In recent years experimental tests have proved several possible commercial applications to which this mineral might be put such as an admix in cement, in the manufacture of magnesium chemicals, in terrazzo, as a substitute for soapstone, and as a filler. During 1938 there was a small shipment of serpentine from one property in San Bernardino County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of an individual.

**Serpentine Production of California, by Years.**

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

**Serpentine Production in California, by Years**

Year	Cubic feet	Value	Year	Cubic feet	Value
1895.....	4,000	\$4,000	1905.....		
1896.....	1,500	6,000	1906.....	847	\$1,694
1897.....	2,500	2,500	1907.....	1,000	3,000
1898.....	750	3,000	1917.....	<sup>a</sup>	<sup>a</sup>
1899.....	500	2,000	1918.....	<sup>b</sup>	<sup>b</sup>
1900.....	350	2,000	1919.....		
1901.....	89	890	1938.....	<sup>a</sup>	<sup>a</sup>
1902.....	512	5,065			
1903.....	99	800			
1904.....	200	2,310	Totals.....	12,347	\$33,259

<sup>a</sup> Under 'Unapportioned.'

<sup>b</sup> See under Marble.

## SLATE

*Bibliography:* State Mineralogist Reports XV, XVIII, XXIV, XXVIII. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California during 1938 amounted to 6,871 short tons at a total value of \$30,281 f.o.b. quarry and came from properties in El Dorado, Los Angeles, Inyo, and Tuolumne counties.

The 1938 figures showed a decrease in value from those of 1937 which were 5,036 tons and 440 squares having a total value of \$32,572. Practically all the slate was crushed and used for roofing granules. The slate came from Los Angeles County and was sold as flagstone.

#### Total Production of Slate in California.

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889.....	4,500	\$18,089	1911.....		
1890.....	4,000	24,000	1915.....	1,000	\$5,000
1891.....	4,000	24,000	1916.....		
1892.....	3,500	21,000	1920.....	8	80
1893.....	3,000	21,000	1921.....		
1894.....	1,800	11,700	1922.....	200	2,400
1895.....	1,350	9,450	1923.....		
1896.....	500	2,500	1926.....	(a)	7,371
1897.....	400	2,800	1927.....	b2,686	17,960
1898.....	400	2,800	1928.....	b4,075	31,263
1899.....	810	5,900	1929.....		
1900.....	3,500	26,250	1930)*.....	b8,220	71,347
1901.....	5,100	38,250	1931.....		
1902.....	4,000	30,000	1932)*.....	b8,234	55,182
1903.....	10,000	70,000	1933.....	b5,343	31,958
1904.....	6,000	50,000	1934.....	b5,065	24,245
1905.....	4,000	40,000	1935.....	(a)	40,912
1906.....	10,000	100,000	1936.....	(a)	49,818
1907.....	7,000	60,000	1937.....	(a)	32,572
1908.....	6,000	60,000	1938.....	b6,871	30,281
1909.....	6,961	45,660			
1910.....	1,000	8,000	Total.....		\$1,076,788

\* Annual details concealed under 'Unapportioned.'

• Quantity not shown as both 'squares' and 'tons' included.

b Tons.

#### MISCELLANEOUS STONE

*Bibliography:* State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII, XXXV. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1938 the output of sand and gravel and that of crushed rock showed an increase in both amount and value over that of the previous year. There was a total value of \$11,734,038 for 'miscellaneous stone' during 1938, compared with \$16,917,683 for 1937. As in the past, Los Angeles County led in the annual output of these products, its 1938 yield being worth \$3,836,394; Alameda County second with an output worth \$1,141,554; Contra Costa County with an output worth \$433,644; followed in turn by Napa, Sacramento, Riverside, Stanislaus, San Diego, San Bernardino, Butte.

#### Paving Blocks.

There was a small output of paving blocks in California during 1938 coming from a single property each in Riverside and Sacramento counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	\$350,000	1913	6,364	\$363,505
1888	10,500	367,500	1914	6,053	270,598
1889	7,303	297,236	1915	3,285	171,092
1890	7,000	245,000	1916	1,322	54,362
1891	5,000	150,000	1917	938	38,567
1892	*3,000	96,000	1918	372	17,000
1893	2,770	96,950	1919	27	1,350
1894	2,517	66,981	1920	63	3,155
1895	2,332	73,338	1921	4	280
1896	4,161	77,584	1922	72	3,924
1897	1,711	35,235	1923	15	850
1898	1,144	21,725	1924	11	935
1899	305	7,561	1925	27	1,350
1900	1,192	23,775	1926		
1901	1,920	41,075	1927	41	2,057
1902	3,502	112,437	1928	25	1,658
1903	4,854	134,642	1929		
1904	3,977	161,752	1930		
1905	3,408	134,347	1931/	66	5,900
1906	4,203	173,432	1932		
1907	4,604	199,347	1934	2	75
1908	7,660	334,780	1935		
1909	4,503	199,503	1938		
1910	4,434	198,916			
1911	4,141	210,819			
1912	11,018	578,365	Totals	135,840	\$5,325,578

\* Figures for 1887-1892 (inclusive) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.

\* Annual details concealed under 'Unapportioned'.

**Grinding-Mill Pebbles.**

The 1938 output of grinding-mill pebbles in California is combined under the 'Unapportioned' item to conceal the production of a single operator in Siskiyou County.

The amount and value of grinding-mill pebbles, annually, follows:

Year	Tons	Value	Year	Tons	Value
1915.....	340	\$2,810	1928.....	372	\$2,408
1916.....	20,232	107,567	1929.....		
1917.....	21,450	90,538	1930}*.....	166	1,225
1918.....	8,628	61,268	1931}*.....		
1919.....	2,607	19,272	1932}*.....	25	211
1920.....	2,104	17,988	1933}*.....		
1921.....	247	1,418	1934}*.....	300	3,018
1922.....	1,571	7,628	1935}*.....		
1923.....	2,650	14,936	1936}*.....	961	8,356
1924.....	434	2,969	1937}*.....		
1925.....	215	1,385	1938}*.....	960	4,800
1926.....	102	612			
1927.....	288	1,800	Totals.....	63,652	\$280,209

\* Annual details concealed under 'Unapportioned.'

**Sand and Gravel.**

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.

The distribution of the 1938 output of sand and gravel by counties is given in the following table:

County	Tons	Value
Alameda*	1,452,139	\$886,193
Alpine	13,965	10,980
Amador	17,055	6,027
Butte	267,616	138,101
Calaveras	35,151	21,258
Colusa	2,953	1,234
Contra Costa*	112,715	75,363
Del Norte	11,182	3,296
Fresno	181,497	116,102
Glenn	180,367	58,725
Humboldt	228,470	66,889
Imperial	71,877	51,404
Inyo	30,383	28,248
Kern	337,687	210,750
Lake	7,116	2,898
Lassen	62,716	28,118
Los Angeles	5,308,491	2,610,451
Madera	6,125	2,875
Marin	18,450	18,450
Mariposa	3,849	4,884
Mendocino	114,535	42,678
Merced	71,978	26,441
Modoc	3,700	2,800
Mono	6,774	4,121
Monterey*, b, c	116,013	151,888
Napa	25,250	12,000
Nevada	53,929	36,877
Orange	293,319	192,444
Placer	87,330	48,458
Plumas	26,030	13,860
Riverside*, b	226,784	115,404
Sacramento*	402,378	234,515
San Bernardino	357,204	195,826
San Diego*, b, c	282,968	227,738
San Joaquin	348,019	165,658
San Luis Obispo*	45,241	19,000
Santa Clara	137,706	54,706
Santa Cruz	166,082	89,739
Shasta	69,267	44,814
Sierra	1,420	710
Siskiyou	21,295	10,654
Stanislaus	135,315	75,168
Sutter	135,100	20,265
Tehama	8,056	3,419
Trinity	12,074	5,791
Tulare	149,710	80,740
Tuolumne	18,567	16,440
Ventura*	576,233	231,483
Yolo	119,393	44,598
Yuba	144,915	163,628
El Dorado, Kings, San Benito, San Francisco, San Mateo*, Santa Barbara, Solano, Sonoma*	477,568	283,268
Totals	12,983,957	\$6,957,377

\* Combined to conceal the output of individual operators in each.

a Includes molding sand.

b Includes blast sand.

c Includes filter sand.

Included in the above is a total of 32,691 tons of molding sand valued at \$90,288 coming from two properties in Contra Costa County; and one each in Alameda, Monterey, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo, and Ventura counties. The 1938 yield showed a decrease compared with 1937 which was 58,489 tons worth \$131,906.

MISCELLANEOUS STONE

Crushed Rock Production, by Counties, for 1938

County	Macadam and ballast		Rubble and riprap		Concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda.....	223,209	\$151,370	3,400	\$1,700	89,114	\$69,720	58,612	32,571	374,335	\$255,361
Butte.....	111,873	94,770	-----	-----	-----	-----	-----	-----	111,873	94,770
Calaveras.....	14,640	14,078	-----	-----	-----	-----	-----	-----	25,459	17,773
Contra Costa.....	233,975	177,847	13,697	22,962	-----	-----	10,819	3,655	390,943	335,309
Del Norte.....	20,630	12,000	-----	-----	-----	-----	153,271	134,500	20,630	12,000
El Dorado.....	35,278	59,434	-----	-----	-----	-----	-----	-----	35,278	59,434
Humboldt.....	-----	-----	-----	-----	-----	-----	-----	-----	13,631	6,816
Imperial.....	3,676	9,467	-----	-----	-----	-----	-----	-----	3,676	9,467
Lassen.....	54,200	31,000	-----	-----	-----	-----	-----	-----	54,200	31,000
Los Angeles.....	121,184	120,418	576,613	607,694	385,500	242,245	546,789	255,586	1,547,045	1,225,943
Mariposa.....	174,799	225,404	43,255	50,512	760	1,440	-----	-----	218,814	277,146
Mendocino.....	4,800	3,600	-----	-----	25	50	-----	-----	4,825	3,650
Merced.....	81,900	111,906	-----	-----	-----	-----	-----	-----	81,900	111,906
Pumas.....	58,186	32,218	18,305	13,299	-----	-----	-----	-----	18,305	13,299
Riverside.....	37,257	37,552	56,817	47,378	-----	-----	149,575	124,796	264,578	204,392
Sacramento.....	14,989	9,622	10,918	7,067	22,318	20,399	77,562	73,562	110,798	83,692
San Bernardino.....	-----	-----	-----	-----	-----	-----	49,656	46,140	86,913	83,692
San Mateo.....	-----	-----	-----	-----	149	182	-----	-----	15,138	9,804
Santa Clara.....	463,555	35,706	-----	-----	-----	-----	196,459	135,565	196,459	135,565
Shasta.....	272,995	105,678	-----	-----	-----	-----	-----	-----	63,555	35,706
Siskiyou.....	42,733	18,770	-----	-----	-----	-----	-----	-----	272,995	105,678
Sonoma.....	1,000	1,000	29,665	29,665	-----	-----	-----	-----	42,733	18,770
Trinity.....	72,959	63,580	3,802	3,327	-----	-----	-----	-----	30,665	30,665
Tuolumne.....	-----	-----	-----	-----	-----	-----	-----	-----	76,761	65,907
Fresno, Inyo, Marin, Modoc, Napa, Nevada, Sacramento <sup>b</sup> , San Benito, Santa Barbara, Santa Clara, Stanislaus, Tehama, Tulare, Ventura <sup>a</sup> .....	832,773	541,620	-----	-----	-----	-----	-----	-----	832,773	541,620
Marin, Napa, Nevada, Placer, San Benito, San Luis Obispo, Santa Clara, Santa Cruz <sup>a</sup> .....	-----	-----	347,085	313,543	-----	-----	-----	-----	347,085	320,610
Butte, Contra Costa, El Dorado, Fresno, Marin, Merced, Napa, Nevada, Orange, San Diego, San Francisco, Santa Clara, Santa Cruz, Stanislaus, Tuolumne, Ventura <sup>a</sup> .....	-----	-----	-----	-----	468,700	17,689	-----	-----	468,700	438,088
Butte, Fresno, Inyo <sup>a</sup> , Kern, Marin, Napa, Nevada, San Diego, San Francisco, San Joaquin, Santa Cruz, Solano, Stanislaus, Tulare <sup>a</sup> .....	-----	-----	-----	-----	-----	-----	357,603	253,688	357,603	332,240
Totals.....	2,466,611	\$1,556,220	1,103,557	\$1,097,147	966,575	\$751,425	1,530,977	\$1,071,869	6,067,720	\$4,776,661

<sup>a</sup> Combined to conceal output of a single operator in each.  
<sup>b</sup> Includes granules for roofing and terrazzo.  
<sup>c</sup> Includes decomposed granite.  
<sup>d</sup> Includes slag.  
<sup>e</sup> Includes volcanic cinder.

**Crushed Rock.**

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

**Miscellaneous Stone Production of California, by Years.**

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

**Crushed Rock, Sand and Gravel, by Years**

Year	Tons	Value	Year	Tons	Value
1893.....	371,000	\$456,075	1917.....	8,069,271	3,505,662
1894.....	661,900	664,838	1918.....	6,641,144	3,325,889
1895.....	1,254,688	1,095,939	1919.....	6,919,188	3,678,322
1896.....	960,619	839,584	1920.....	9,792,122	6,782,414
1897.....	821,123	600,112	1921.....	10,914,145	7,834,640
1898.....	1,177,365	814,477	1922.....	13,049,644	10,366,231
1899.....	964,898	786,892	1923.....	19,840,301	15,379,538
1900.....	789,287	561,642	1924.....	21,451,129	15,962,476
1901.....	530,396	641,037	1925.....	23,819,137	17,407,113
1902.....	2,056,015	1,249,529	1926.....	24,987,606	19,559,261
1903.....	2,215,625	1,673,591	1927.....	25,126,691	18,912,994
1904.....	2,296,898	1,641,877	1928.....	27,471,794	17,328,044
1905.....	2,624,257	1,716,770	1929.....	27,104,618	17,840,159
1906.....	1,555,372	1,418,406	1930.....	23,514,168	16,430,027
1907.....	2,288,888	1,916,015	1931.....	15,848,313	11,848,531
1908.....	3,998,945	3,241,774	1932.....	11,361,564	7,183,643
1909.....	5,531,561	2,708,326	1933.....	11,181,156	6,671,581
1910.....	5,827,828	2,777,690	1934.....	16,148,275	7,131,330
1911.....	6,487,223	3,610,357	1935.....	9,041,376	5,671,041
1912.....	8,044,937	4,532,598	1936.....	28,528,079	16,678,238
1913.....	9,817,616	4,823,056	1937.....	28,254,740	16,917,683
1914.....	9,288,397	3,960,973	1938.....	19,051,677	11,734,038
1915.....	10,879,497	4,609,278			
1916.....	9,951,089	4,009,590			
			Totals.....	458,512,162	\$308,798,881

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.



## CHAPTER FIVE

## INDUSTRIAL MATERIALS

**Bibliography:** State Mineralogist Reports XII-XXXV (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have clearly a defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

In 1937 the mineral zircon was added to this group. The material mined was used as an abrasive and a refractory.

This group, as a whole, showed a decrease in total value from \$6,154,918 in 1937 to \$5,027,093 in 1938.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1937 and 1938.

Substance	1937		1938		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Bentonite.....	8,425 tons	\$140,261	9,374 tons	\$113,164	\$27,097—
Clay (pottery).....	354,669 tons	705,200	304,564 tons	582,608	122,592—
Dolomite.....	12,371 tons	24,603	.....	•	•
Feldspar.....	2,686 tons	10,930	.....	•	•
Gems.....	.....	2,075	.....	4,575	2,500+
Gypsum.....	186,160 tons	384,431	161,996 tons	327,821	56,610—
Limestone.....	351,755 tons	830,562	302,655 tons	729,149	101,413—
Mineral water.....	18,309,729 gals.	1,130,810	26,900,959 gals.	853,998	276,812—
Pumice and volcanic ash.....	10,392 tons	79,005	18,783 tons	105,207	26,202+
Silica (glass, sand, quartz).....	84,313 tons	348,987	63,167 tons	278,676	70,311—
Talc and soapstone.....	29,657 tons	347,772	28,346 tons	290,810	56,962—
Unapportioned.....	.....	\$2,155,282	.....	\$1,741,085	414,197—
Total values.....	.....	\$6,159,918	.....	\$5,027,093	.....
Net decrease.....	.....	.....	.....	.....	\$1,132,825

\* Included 'Unapportioned.'

† Includes barite, carbon dioxide, diatomite, fluorite, mica, mineral paint, pyrite, sillimanite-andalusite-kyanite group, sulphur, zircon.

‡ Includes barite, carbon dioxide, diatomite, dolomite, feldspar, garnets, lithia, mica, pyrite, sillimanite-andalusite-kyanite group, sulphur, calcium silicate.

## ASBESTOS

*Bibliography:* State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII, XXXIV. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1937 there was no asbestos reported produced in California. In 1934 there was a small output of this material coming from a property in Napa County, and was used in roofing and plaster. The 1934 annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

## Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	30	\$1,800	1912.....	90	\$2,700
1888.....	30	1,800	1913.....	47	1,175
1889.....	30	1,800	1914.....	51	1,530
1890.....	71	4,260	1915.....	143	2,860
1891.....	66	3,960	1916.....	145	2,380
1892.....	30	1,830	1917.....	136	10,225
1893.....	50	2,500	1918.....	229	9,903
1894.....	50	2,250	1919.....	131	6,240
1895.....	25	1,000	1920.....	410	19,275
1896.....	-----	-----	1921.....	50	1,800
1897.....	-----	-----	1922.....	20	200
1898.....	10	200	1923.....	70	4,750
1899.....	30	750	1924.....	25	1,650
1900.....	50	1,250	1925.....	-----	-----
1901.....	110	4,400	1926.....	13	1,160
1902.....	-----	-----	1927.....	-----	-----
1903.....	-----	-----	1928.....	219	6,175
1904.....	10	162	1929.....	-----	-----
1905.....	112	2,625	1930.....	-----	-----
1906.....	70	3,500	1931.....	-----	-----
1907.....	70	3,500	1932.....	309	3,274
1908.....	70	6,100	1933.....	-----	-----
1909.....	65	6,500	1934.....	-----	-----
1910.....	200	20,000	1935.....	-----	-----
1911.....	125	500	1936.....	-----	-----
			Totals.....	3,392	\$145,984

\* Annual details concealed under 'Unapportioned.'

## BARITE

*Bibliography:* State Mineralogist Reports XXII, XIV, XV, XVII, XXI-XXVIII (inc.), XXXIV. Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Circ. 6221, 6223.

During 1938 the barite produced in California came from two properties in Mariposa County, the annual details being concealed in the 'Unapportioned' item so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, in heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

Commercial production of barite in California for 1936 and 1937 amounted to a total of 41,882 short tons valued at \$245,393 f.o.b. rail shipping point.

The Tariff Act of 1930 placed a duty on foreign imported barite ore, crude or unmanufactured, of \$4 per ton; ground or otherwise manufactured, of \$7.50 per ton.

Present quotations for barite (93% BaSO<sub>4</sub>) vary from \$6.50 to \$7.50 per tons, crude, f.o.b. rail-shipping point. Most barite has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, has given the largest commercial production to date, in part witherite (barium carbonate, BaCO<sub>3</sub>). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit.

#### Total Barite Production of California.

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910.....	860	\$5,640	1925.....		
1911.....	309	2,207	1926.....	4,978	\$38,165
1912.....	564	2,812	1927.....	17,993	90,617
1913.....	1,600	3,680	1928.....	13,406	55,888
1914.....	2,000	3,000	1929.....	26,796	168,829
1915.....	410	620	1930.....	19,783	133,107
1916.....	1,606	5,516	1931.....	27,832	156,647
1917.....	4,420	25,633	1932.....	8,507	49,409
1918.....	100	1,500	1933.....	8,405	49,595
1919.....	1,501	18,065	1934.....	21,769	125,514
1920.....	3,029	20,795	1935.....	22,979	133,310
1921.....	901	4,809	1936.....	41,882	245,392
1922.....	3,370	18,925	1937.....	*	*
1923.....	2,925	16,058	1938.....		
1924.....			Totals.....	237,925	\$1,376,243

\* Annual details concealed under 'Unapportioned.'

#### BENTONITE (Fuller's Earth)

*Bibliography:* State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.), XXXIV. Bulletins 83, 91. U. S. Bureau of Mines, Bulletin 71. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

During 1938 there was produced and shipped in California 9,374 tons of bentonite (fuller's earth) valued at \$113,164, coming from eight properties—six in San Bernardino and one each in Inyo and Los Angeles counties. The 1938 output, as compared with that of 1937 showed a decrease in amount and value, and was 8,425 tons worth \$140,261.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is

employed in uses that can not be classed as fuller's earth and therefore had been classified in these reports under pottery clay. This was somewhat confusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthy, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of \$1.50 a ton on foreign produced imported fuller's earth.

#### Bentonite Production of California, by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899.....	620	\$12,400	1920.....	600	\$6,000
1900.....	500	3,750	1921.....	1,185	8,295
1901.....	1,000	19,500	1922.....	6,606	48,756
1902.....	987	19,246	1923.....	3,650	55,125
1903.....	250	4,750	1924.....	5,290	67,295
1904.....	500	9,500	1925.....	5,280	91,842
1905.....	1,344	38,000	1926.....	23,552	250,192
1906.....	440	10,500	1927.....	13,018	154,764
1907.....	100	1,000	1928.....	53,232	501,743
1908.....	50	1,000	1929.....	15,541	170,563
1909.....	459	7,385	1930.....	12,522	177,964
1910.....	340	3,820	1931.....	13,960	222,583
1911.....	466	5,294	1932.....	4,295	57,670
1912.....	876	6,500	1933.....	4,605	60,621
1913.....	460	3,700	1934.....	6,168	69,325
1914.....	760	5,928	1935.....	10,204	68,372
1915.....	692	4,002	1936.....	10,185	165,131
1916.....	110	550	1937.....	8,425	140,261
1917.....	220	2,180	1938.....	9,374	113,164
1918.....	37	333			
1919.....	385	3,810	Totals.....	201,387	\$1,928,725

#### CALCIUM SILICATE

*Bibliography:* Mining and Metallurgy: Oct., 1935.

During 1938 there were commercial shipments of calcium silicate reported in California, coming from two properties in Kern County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of either operator.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radamacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wool. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass. Experiments now being conducted by Mr. A. M. M. Russell, Testing Engineer of the State Harbor Commissioners, indicate that wollastonite should be a valuable addition to concrete.

Pyroxene is a silicate of calcium and magnesium and is found in crystalline limestone near the contact with intrusive igneous rocks and in basic igneous rocks such as gabbros. It is white to various shades of green, brown to black, having a hardness of 5 to 6 and a specific gravity 3.2 to 3.6.

Wollastonite is a calcium metasilicate ( $\text{CaSiO}_3$ ) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of  $4\frac{1}{2}$  to 5 and a specific gravity of about 2.9.

Calcium silicate from 1934 to 1936 was classed in these California mineral production reports as wollastonite.

CARBON DIOXIDE GAS

*Bibliography:* State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells. During 1938 there were two companies producing carbon dioxide from wells near Niland. The 1938 figures are combined under the 'Unapportioned' item to conceal the output of either operator.

Carbon Dioxide Gas Production in California, by Years

Year	M cubic feet	Value
1894.....	80	\$4,072
1895.....	800	12,000
1896.....	81	1,300
1897.....		
1933.....		
1934.....*	15,440	1,822
1935.....		
1936.....*	89,777	64,787
1937.....		
1938.....	*	*
Totals.....	106,178	\$83,981

\* Annual details concealed under 'Unapportioned.'

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**CLAY (Pottery)**

*Bibliography:* State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXIII (inc.), XXXV. Bulletins 38, 99. Preliminary Report No. 7. U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these, 22 contributed in 1938. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods, and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.

During 1938 there was a total of 54 properties in 22 counties which reported an output of 304,564 short tons of pottery clay valued at \$582,608 f.o.b. rail-shipping point for the crude material, as compared with 61 properties in 21 counties producing 354,669 tons, worth \$705,200 in 1937.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data set in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1938 is shown herewith:

Pottery Clay in 1938

County	Tons	Value	Used in the manufacture of
Alameda .....	5,244	\$5,532	Roofing, floor, and mantel tile; chimney, drain, and sewer pipe. Prepared clay and various.
Amador* .....	42,679	73,422	Architectural terra cotta; fire clay and refractories; chimney; drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.
Kern <sup>b</sup> .....	38,910	64,821	Floor and fancy tile, sanitary ware, art pottery, China, and oil-well drilling-mud.
Los Angeles .....	30,766	55,605	Red earthenware; chimney, drain and sewer pipe; vents; floor, mantel, and roofing tile; art pottery; and various.
Orange .....	22,522	89,905	Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and various.
Placer .....	60,708	85,337	Architectural terra cotta; chimney, drain and sewer pipe; faience; floor, mantel, and roofing tile; red earthenware; electrical porcelain; sanitary ware; and various.
Riverside .....	47,977	87,489	Conduit, sewer, and drain pipe; red earthenware; faience, floor, mantel, and roofing tile; and various.
San Bernardino .....	3,651	26,249	Roofing, floor and mantel tile; drain and sewer pipe; red earthenware; refractories; fire-sand and various.
Ventura <sup>b</sup> .....	11,624	10,453	Oil-well drilling-mud.
Calaveras, Contra Costa, Fresno, Humboldt, Imperial, Marin, Mono, San Diego, San Luis Obispo <sup>b</sup> , Santa Barbara, Santa Clara, Sonoma, Stanislaus, Sutter*	40,483	83,746	Drain, roofing, and mantel tile; saggars; electrical porcelain; refractories; red earthenware, garden furniture; oil-well drilling-mud; sewer, drain, and conduit pipe; prepared clay, light weight aggregate; and various.
Totals .....	304,564	\$582,608	

\* Includes firesand.

<sup>b</sup> Includes clay and shale used for oil-well drilling-mud.

\* Combined to conceal the output of single operators in each.

## POTTERY CLAY PRODUCTS

The value of the various pottery clay products made in California during 1938 totaled \$10,437,383, compared with \$11,307,859 in 1937. The distribution for 1938 is shown in the following tabulation:

Product	Number producers	Tons	Value
Architectural terra cotta, chimney pipe and flue lining .....	11	10,226	\$457,376
Drain pipe .....	16	7,822	158,544
Roofing tile .....	17	35,285	645,213
Floor, faience, mantel, and hand-made tile .....	24	-----	2,096,512
Sewer pipe .....	9	52,639	1,346,404
Red earthenware .....	5	-----	142,749
Stoneware and chemical stoneware .....	5	-----	435,666
Electrical porcelain .....	3	-----	241,500
Conduit pipe .....	3	-----	72,927
Fire clay and high temperature cement .....	6	10,444	138,570
Chinaware .....	5	-----	2,345,480
Sanitary ware and plumbing fixtures .....	5	-----	1,900,077
Miscellaneous: chimney accessories, gas-stove radiants, porcelain shapes, gas-house tank-blocks, grog, molding clay, segment blocks and liners, vents, glass tank blocks and liners, light aggregate, glazed kitchenware, quarries, swimming-pool gutters, fire clay shapes, and specialties .....	16	-----	457,365
Total value .....	-----	-----	\$10,437,383

**Pottery Clay Production of California, by Years.**

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887.....	75,000	\$37,500	1914.....	179,948	\$167,552
1888.....	75,000	37,500	1915.....	157,866	133,724
1889.....	75,000	37,500	1916.....	134,636	146,538
1890.....	100,000	50,000	1917.....	166,298	154,602
1891.....	100,000	50,000	1918.....	112,423	166,788
1892.....	100,000	50,000	1919.....	135,708	245,019
1893.....	24,856	67,284	1920.....	203,997	440,689
1894.....	28,475	35,073	1921.....	225,120	362,172
1895.....	37,660	39,685	1922.....	277,232	473,184
1896.....	41,907	62,900	1923.....	376,863	697,841
1897.....	24,592	30,290	1924.....	417,928	651,857
1898.....	28,947	33,747	1925.....	537,587	674,376
1899.....	40,600	42,700	1926.....	801,461	806,509
1900.....	59,636	60,956	1927.....	867,419	872,661
1901.....	55,679	39,144	1928.....	887,807	1,394,950
1902.....	67,933	74,163	1929.....	839,949	1,127,527
1903.....	90,972	99,907	1930.....	938,586	795,517
1904.....	84,149	81,952	1931.....	332,680	408,931
1905.....	133,805	130,146	1932.....	167,284	204,890
1906.....	167,267	162,283	1933.....	141,629	211,711
1907.....	160,385	254,454	1934.....	190,510	245,900
1908.....	208,042	325,147	1935.....	240,014	377,969
1909.....	299,424	465,647	1936.....	382,823	646,920
1910.....	249,028	324,099	1937.....	354,669	705,200
1911.....	224,576	252,759	1938.....	304,564	582,608
1912.....	199,605	215,653			
1913.....	231,179	261,273	Totals.....	12,358,618	\$16,027,427

**DIATOMITE (Diatomaceous Earth)**

*Bibliography:* State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI, XXXIII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp. 1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds) and extremely porous, chalk-like material composed of pure silica (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The Santa Barbara material is diatomaceous and is of a superior quality, particularly for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Fresno, Kern, Los Angeles, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma and Tehama counties.

As about 70 per cent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were six operators during 1938 in Los Angeles, Monterey, and Santa Barbara counties. The shipments during the year showed a decrease in total tonnage and value compared with 1937.



The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.

**Total Production of Dolomite in California.**

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889.....	39	\$1,335	1915.....	12,400	\$42,000
1890.....			1916.....	15,322	80,649
1891.....			1917.....	24,301	127,510
1892.....			1918.....	35,963	189,459
1893.....	50	2,000	1919.....	40,200	217,800
1894.....	51	2,040	1920.....	60,764	1,066,260
1895.....			1921.....		
1896.....			1922.....	*90,739	1,016,675
1897.....	5	200	1923.....		
1898.....			1924.....	*193,064	5,729,736
1899.....			1925.....		
1900.....			1926.....		
1901.....			1927.....	*275,403	1,995,923
1902.....	422	2,532	1928.....		
1903.....	2,703	16,015	1929.....		
1904.....	6,950	112,282	1930.....	*300,017	4,848,661
1905.....	3,000	15,000	1931.....		
1906.....	2,430	14,400	1932.....		
1907.....	2,531	28,948	1933.....	*203,228	3,104,154
1908.....	2,950	32,012	1934.....		
1909.....	500	3,500	1935.....		
1910.....	1,843	17,617	1936.....	*290,908	4,243,572
1911.....	2,194	19,670	1937.....		
1912.....	4,129	17,074	1938.....	*	*
1913.....	8,645	35,968			
1914.....	12,840	80,350	Totals.....	1,593,591	\$22,933,557

\* Annual details concealed under 'Unapportioned.'

**DOLOMITE**

**Bibliography:** State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI, XXXIII-XXXIV.

The 1938 output of dolomite in California came from three properties—one each in Inyo, Los Angeles, and San Benito counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of competitive operators. The 1938 production showed a decrease in amount and value as compared with that of 1937, which was 112,371 tons, worth \$24,603.

The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco dash-coat, terrazzo, artstone, for the manufacture of CO<sub>2</sub>, and mineral wool.

**Dolomite Production of California, by Years.**

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value	Year	Tons	Value
1915.....	4,192	\$14,504	1928.....	38,379	\$85,342
1916.....	13,313	46,566	1929.....	58,644	156,928
1917.....	27,911	66,416	1930)*.....	66,564	161,245
1918.....	24,560	79,441	1931).....		
1919.....	24,502	67,953	1932.....	35,275	40,956
1920.....	42,388	132,791	1933.....	54,456	176,575
1921.....	31,195	99,155	1934)*.....	108,645	304,984
1922.....	52,409	114,911	1935).....		
1923.....	69,519	142,615	1936.....	25,807	63,102
1924.....	28,843	71,271	1937.....	12,371	24,632
1925.....	42,852	104,900	1938.....	*	*
1926.....	68,640	119,313			
1927.....	45,976	79,442	Totals.....	976,441	\$2,153,033

\*Annual details concealed under 'Unapportioned.'

### FELDSPAR

*Bibliography:* State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI, XXXIV-XXXV. Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

The 1938 output of feldspar in California came from a single property each in Fresno and San Diego counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The 1938 production was a decrease in quantity and value as compared with that of 1937 which was 2,686 tons worth \$10,930.

#### Total Feldspar Production in California.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Tons	Value	Year	Tons	Value
1910.....	760	\$5,720	1926.....	7,300	56,400
1911.....	740	4,560	1927.....	10,932	86,101
1912.....	1,382	6,180	1928.....	14,628	93,745
1913.....	2,129	7,850	1929.....	13,327	78,404
1914.....	3,530	16,565	1930.....	5,014	35,654
1915.....	1,800	9,000	1931.....	4,795	59,921
1916.....	2,630	14,350	1932.....	2,294	15,988
1917.....	11,792	46,411	1933).....		
1918.....	4,132	22,061	1934)*.....	2,655	30,611
1919.....	1,272	12,965	1935.....	3,265	21,855
1920.....	4,518	26,189	1936.....	3,430	24,959
1921.....	4,349	28,343	1937.....	2,686	10,930
1922.....	4,587	37,109	1938.....	*	*
1923.....	11,100	81,800			
1924.....	9,055	68,112	Totals.....	143,267	\$961,393
1925.....	8,165	59,615			

\* Annual details concealed under 'Unapportioned.'

## FLUORSPAR

*Bibliography:* State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

During 1938 there was no commercial production of fluorspar reported in California.

The 1937 output of fluorspar came from a single property in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. This material was shipped to steel mills to be used as a flux. The combined production of 1933 and 1934 amounted to a total of 227 tons worth \$3,631.

Fluorspar, or calcium fluoride,  $\text{CaF}_2$ , is one of the most important nonmetallic minerals from an industrial standpoint. About 80 per cent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at \$991 was shipped from Riverside County.

Present quotations (Metal and Mineral Markets) are: not less than 85 per cent  $\text{CaF}_2$  and not over 5 per cent  $\text{SiO}_2$ , \$18 to \$19 per ton; No. 2 lamp, \$18 to \$19 per ton.

## GARNET (Abrasive)

During 1938 there was a shipment of abrasive garnets as a by-product from a tungsten mine near Bishop in Inyo County. This was the first commercial production reported in California. The exact figures are concealed under the 'Unapportioned' item so as not to reveal the output of a single operator.

Most garnets are utilized on paper and cloth used for woodworking and shoe manufacture.

Massive deposits of garnet have been noted in several places in California but little has been done to commercialize them owing to the lack of a market.

## GEMS

*Bibliography:* State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX-XXXII (inc.), XXXIV-XXXV. Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones are gathered and marketed, for the most part in a small way. The gem material reported in California during 1938 had a total value of

\$4,575. This output came from Fresno, Imperial, Modoc, Monterey, San Diego, and Santa Clara counties, and consisted of jasper, kunzite, iceland spar, iridescent obsidian, tourmaline, and topaz. The above value showed a decrease as compared with that of 1937 which was worth \$2,075.

**Total Production of Gem Materials in California.**

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900.....	\$20,500	1921.....	\$10,954
1901.....	40,000	1922.....	1,312
1902.....	162,100	1923.....	13,220
1903.....	110,500	1924.....	4,800
1904.....	136,000	1925.....	10,663
1905.....	148,500	1926.....	9,049
1906.....	497,090	1927.....	7,035
1907.....	232,642	1928.....	22,200
1908.....	208,950	1929.....	26,850
1909.....	193,700	1930.....	3,540
1910.....	237,475	1931.....	5,607
1911.....	51,824	1932.....	4,961
1912.....	23,050	1933.....	690
1913.....	13,740	1934.....	2,456
1914.....	3,970	1935.....	945
1915.....	3,565	1936.....	2,878
1916.....	4,752	1937.....	2,075
1917.....	3,049	1938.....	4,575
1918.....	650		
1919.....	5,425		
1920.....	36,056	Total value.....	\$2,267,248

**GRAPHITE**

*Bibliography:* State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.), XXX, XXXIII, XXXV. Bulletins 67, 91. U. S. G. S., Min. Res., 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County.

During 1938 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item in order not to reveal the output of the single operator.

**Graphite Production of California, by Years.**

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:

Year	Pounds	Value	Year	Pounds	Value
1901.....	128,000	\$4,480	1923.....		
1902.....	84,000	1,680	1925.....		
1903.....			1926.....	*76,000	13,120
1913.....	2,500	25	1927.....		
1914.....			1928.....		
1915.....			1931.....		
1916.....	29,190	2,335	1932.....	*156,000	1,950
1917.....			1933.....		
1918.....			1934.....		
1919.....	*770,000	37,225	1935.....	.	.
1920.....			1936.....		
1921.....			Totals.....	1,869,690	\$86,975
1922.....	*624,000	26,160			

\* Annual details concealed under 'Unapportioned,' on account of a single producer.

**GYPSUM**

*Bibliography:* State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI, XXX-XXXV (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During 1938 there was a production of gypsum in California coming from three properties in Fresno County and one each in Imperial and Riverside counties and amounting to 161,996 short tons valued at \$327,821. In addition to the above figures there was considerable amount of gypsum coming from Alameda County which is obtained in a chemical process of reducing magnesium salts from bittern waters with lime, the amount of which is not included in the State total as the figures are already used in those of magnesium salts and lime. The 1938 output showed a decrease in both amount and value as compared with those of 1937 which were 186,160 tons valued at \$384,431.

**Total Production of Gypsum in California.**

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	2,700	\$27,000	1914.....	29,734	\$78,375
1888.....	2,500	25,000	1915.....	20,200	48,953
1889.....	3,000	30,000	1916.....	33,384	59,533
1890.....	3,000	30,000	1917.....	30,825	56,840
1891.....	2,000	20,000	1918.....	19,695	37,176
1892.....	2,000	20,000	1919.....	19,813	50,579
1893.....	1,620	14,280	1920.....	20,507	92,535
1894.....	2,446	24,584	1921.....	37,412	78,875
1895.....	5,158	51,014	1922.....	47,084	188,336
1896.....	1,310	12,580	1923.....	86,410	289,136
1897.....	2,200	19,250	1924.....	25,569	53,210
1898.....	3,100	23,600	1925.....	107,613	172,444
1899.....	3,663	14,950	1926.....	114,868	211,337
1900.....	2,522	10,088	1927.....	94,630	292,090
1901.....	3,875	38,750	1928.....	104,790	200,567
1902.....	10,200	53,500	1929.....	140,844	396,951
1903.....	6,914	46,441	1930.....	116,865	243,507
1904.....	8,350	56,592	1931.....	88,354	199,198
1905.....	12,859	54,500	1932.....	46,867	93,818
1906.....	21,000	69,000	1933.....	59,235	120,451
1907.....	8,900	57,700	1934.....	58,149	113,606
1908.....	34,600	155,400	1935.....	70,833	151,807
1909.....	30,700	138,176	1936.....	143,549	282,703
1910.....	45,294	129,152	1937.....	186,160	384,431
1911.....	31,457	101,475	1938.....	161,996	327,821
1912.....	37,529	117,388			
1913.....	47,100	135,050			
			Totals.....	2,201,372	\$5,699,749

**LIMESTONE**

*Bibliography:* State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.), XXXIII-XXXV (inc.). Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was produced by 21 properties in 12 counties in California during 1938 to the amount of 302,655 short tons valued at \$729,149, this being a decrease in both amount and value from the 1937 output, which was 351,755 tons worth \$830,562. The 1938 yield came from four properties each in El Dorado and Santa Clara counties; three in San Bernardino County; two each in Santa Cruz and Tuolumne counties; and one each in Butte, Fresno, Inyo, Los Angeles, Riverside, San Luis Obispo, and San Mateo counties.

Distribution of the 1938 output of limestone was as follows:

County	Tons	Value
El Dorado.....	135,142	\$304,420
San Bernardino.....	14,313	44,795
Santa Clara <sup>b</sup> .....	98,944	128,793
Butte, Fresno <sup>a</sup> , Inyo, Los Angeles, Riverside, San Luis Obispo, San Mateo <sup>b</sup> , Santa Cruz, and Tuolumne*.....	54,256	251,141
Totals.....	302,655	\$729,149

\* Combined to conceal the output of individual operators in each.

<sup>a</sup> Includes marl.

<sup>b</sup> Includes shells.

The amount here does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whitening for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno County was marl; and that from San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1938 approximately 128,195 tons valued at \$310,449 was used for agricultural purposes and poultry grits.

#### Limestone Production of California, by Years.

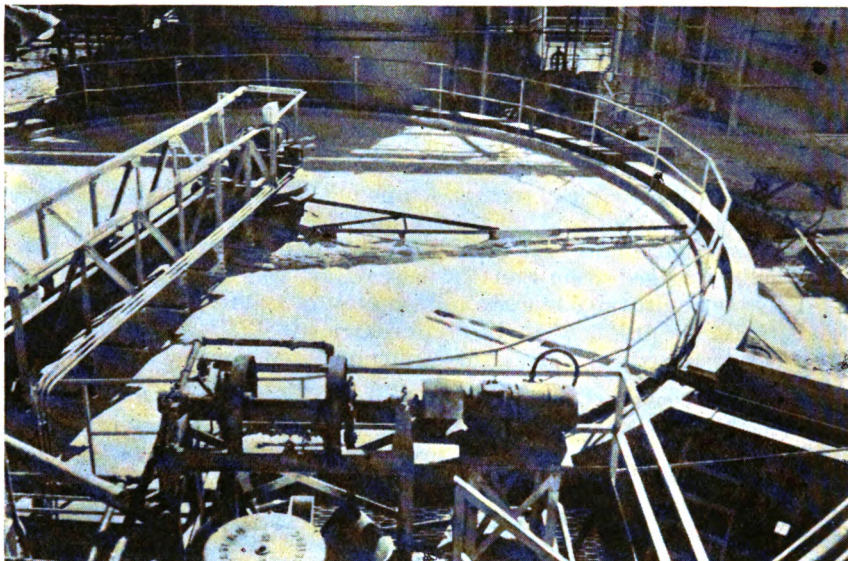
The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

Year	Tons	Value	Year	Tons	Value
1894.....	15,420	\$19,275	1918.....	208,566	\$456,258
1895.....	71,355	71,690	1919.....	83,291	245,145
1896.....	68,184	71,112	1920.....	90,120	298,197
1897.....	36,796	38,556	1921.....	75,921	305,912
1898.....	27,686	24,548	1922.....	84,382	282,181
1899.....	30,769	29,185	1923.....	143,266	345,464
1900.....	32,791	31,532	1924.....	219,476	582,660
1901.....	76,937	99,445	1925.....	319,977	494,525
1902.....	71,422	90,524	1926.....	108,795	367,501
1903.....	125,919	163,988	1927.....	699,790	665,957
1904.....	40,207	87,207	1928.....	127,895	397,935
1905.....	192,749	323,325	1929.....	165,315	557,617
1906.....	80,262	162,827	1930.....	169,477	508,751
1907.....	230,985	406,041	1931.....	177,268	560,699
1908.....	273,890	297,264	1932.....	168,950	487,788
1909.....	337,676	419,921	1933.....	207,371	487,712
1910.....	684,635	581,208	1934.....	198,057	461,139
1911.....	516,398	452,790	1935.....	227,214	496,054
1912.....	613,375	570,248	1936.....	295,792	661,757
1913.....	301,918	274,455	1937.....	351,755	830,562
1914.....	572,272	517,713	1938.....	302,665	729,149
1915.....	146,324	156,288			
1916.....	187,521	217,733			
1917.....	237,279	356,396			
			Totals.....	9,405,103	\$15,689,234

#### LITHIA

**Bibliography:** State Mineralogist Reports II, IV, XIV, XXI, XXX, XXXV. Bulletins 38, 67, 91.

During 1938 lithium salts were again produced in California; but coming from a single property, the figures are concealed under the 'Unapportioned' item. The 1938 material came from the brines of Searles Lake in San Bernardino County at the plant of the American Potash and Chemical Corporation, in the form of sodium-lithium phosphate, and was the first output of this kind, previous production being the mineral lepidolite.



Skimming off sodium-lithium phosphate, in plant of American Potash and Chemical Co., at Searles Lake, San Bernardino Co.

Photo by Walter W. Bradley

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1937 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia mica total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899.....	124	\$4,600	1920.....	10,046	\$153,502
1900.....	440	11,000	1921.....		
1901.....	1,100	27,500	1922.....	*1,365	20,781
1902.....	822	31,880	1923.....		
1903.....	700	27,300	1924.....	109	2,269
1904.....	641	25,000	1925.....		
1905.....	25	276	1926.....		
1906.....			1927.....	*550	13,900
1915.....	91	1,365	1928.....		
1916.....	71	1,065	1929.....		
1917.....	880	8,800	1930.....	*	*
1918.....	4,111	73,998			
1919.....	800	14,400	Totals.....	21,875	\$417,636

\* Annual details concealed under 'Unapportioned.'



## MICA

**Bibliography:** State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX, XXXIII-XXXV (inc.). Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California with the exception of 1934. The 1938 output of mica came from a single property in Imperial County. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the individual operator. The material mined during the year was sericite. Sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. A small amount of vermiculite, a hydrous mica, expanded by heating and then used as an insulating agent, was mined in 1936.

Production of mica in California has been as follows:

Year	Tons	Value	Year	Tons	Value
1902.....	50	\$2,500	1934.....		
1903.....	50	3,800	1935)*.....		
1904.....	50	3,000	1936)*.....	3,833	\$15,650
1929).....			1937)*.....	4,909	31,751
1930)*.....	2,240	15,260	1938)*.....		
1931.....			Totals.....	13,149	\$85,924
1932)*.....	1,957	13,963			
1933)*.....					

\* Annual details concealed under 'Unapportioned.'

## MINERAL PAINT

**Bibliography:** State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.), XXXV. Bulletins 38, 91.

During 1938 no output of mineral paint was reported in California. In 1937 there was a small amount of mineral paint produced, which came from a single property each in Nevada, Placer and Yuba counties. The details are concealed under 'Unapportioned' so as not to reveal individual output. The material from Nevada and Yuba counties was a limonite and that from Placer County a sienna.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity and Yuba counties, in which they are found.

Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith :

Year	Tons	Value	Year	Tons	Value
1890.....	40	\$480	1915.....	311	\$1,756
1891.....	22	880	1916.....	643	3,960
1892.....	25	750	1917.....	520	2,700
1893.....	590	26,795	1918.....	728	4,738
1894.....	610	14,140	1919.....	1,780	17,055
1895.....	750	8,425	1920.....	779	8,477
1896.....	395	5,540	1921.....	446	4,748
1897.....	578	8,165	1922.....	1,620	13,277
1898.....	653	9,695	1923.....	1,049	11,773
1899.....	1,704	20,294	1924.....	532	5,234
1900.....	529	3,993	1925.....	669	6,969
1901.....	325	875	1926.....	569	5,846
1902.....	589	1,533	1927*.....	919	9,592
1903.....	2,370	3,720	1928.....	467	2,820
1904.....	270	1,985	1929.....	250	3,000
1905.....	754	4,025	1930*.....		
1906.....	250	1,720	1931.....		
1907.....	250	1,720	1932.....		
1908.....	335	2,250	1933.....		
1909.....	305	2,325	1935*.....	570	5,550
1910.....	200	2,040	1936.....		
1911.....	186	1,184	1937.....		
1912.....	300	1,800	1938.....		
1913.....	303	1,780			
1914.....	132	847	Totals.....	23,717	\$227,648

\* Annual details concealed under 'Unapportioned.'

MINERAL WATER

*Bibliography:* State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXIII (inc.), XXXV. U. S. G. S., Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial production of mineral water during 1938 amounted to 26,900,959 gallons valued at \$853,998, as compared with 18,309,729 gallons valued at \$1,130,810 in 1937. The 1938 output came from springs on 41 properties in 20 counties, and was distributed as follows:

County	Gallons	Value
Lake.....	26,560	\$12,770
Los Angeles.....	8,398,855	349,028
Napa.....	53,151	9,658
Sonoma.....	123,604	4,365
Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Marin, Modoc, Placer, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Siskiyou*	18,398,788	478,177
<b>Totals.....</b>	<b>26,900,959</b>	<b>\$853,998</b>

\* Combined to conceal the output of operators in each.

The production above tabulated came either from springs or artesian wells, and was bottled, in part with artificial carbonation, but mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors.

#### Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,<sup>1</sup> and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

Year	Gallons	Value	Year	Gallons	Value
1887.....	618,162	\$144,368	1914.....	2,443,572	\$476,169
1888.....	1,112,202	252,990	1915.....	2,274,267	467,738
1889.....	808,625	252,241	1916.....	2,273,617	410,112
1890.....	258,722	89,786	1917.....	1,942,020	340,566
1891.....	334,553	139,959	1918.....	1,808,791	375,650
1892.....	331,875	162,019	1919.....	2,233,842	340,117
1893.....	383,179	90,667	1920.....	2,391,791	421,643
1894.....	402,275	184,481	1921.....	3,446,278	367,476
1895.....	701,397	291,500	1922.....	4,276,346	486,424
1896.....	808,843	337,434	1923.....	5,487,276	618,919
1897.....	1,508,192	345,863	1924.....	8,159,211	818,728
1898.....	1,429,809	213,817	1925.....	12,115,072	1,230,455
1899.....	1,338,537	406,691	1926.....	14,074,877	1,171,550
1900.....	2,456,115	268,607	1927.....	16,844,423	1,487,183
1901.....	1,555,328	559,057	1928.....	25,049,002	1,304,989
1902.....	1,701,142	612,477	1929.....	27,032,083	2,040,615
1903.....	2,056,340	558,201	1930.....	37,354,111	2,870,663
1904.....	2,430,320	496,946	1931.....	26,164,331	1,347,880
1905.....	2,194,150	538,700	1932.....	19,031,224	1,498,988
1906.....	1,585,690	478,186	1933.....	15,650,406	719,746
1907.....	2,924,269	544,016	1934.....	19,882,436	1,071,197
1908.....	2,789,715	560,507	1935.....	16,659,254	940,333
1909.....	2,449,834	465,488	1936.....	19,348,613	777,899
1910.....	2,335,259	522,009	1937.....	18,309,729	1,130,810
1911.....	2,637,669	590,654	1938.....	26,900,959	853,998
1912.....	2,497,794	529,384			
1913.....	2,350,792	599,748	<b>Totals.....</b>	<b>372,954,419</b>	<b>\$33,890,601</b>

<sup>1</sup> Cronise, T. F., The natural wealth of California, p. 182, 1868.

## PHOSPHATES

*Bibliography:* State Mineralogist Report XXI. Bulletins 67, 91.

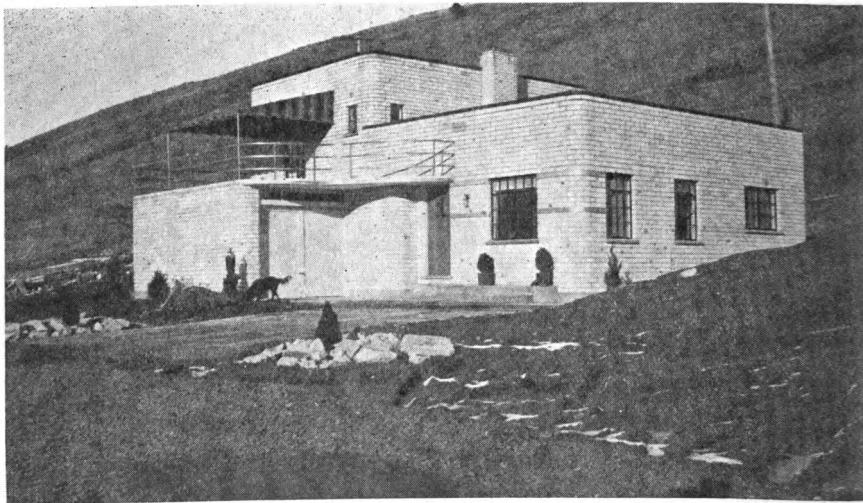
No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite,  $\text{Li (AlF) PO}_4$ , have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia. During 1938, recovery began on a commercial scale of sodium-lithium phosphate at the plant of the American Potash and Chemical Corporation, at Searles Lake, San Bernardino County. However, the product is sold for its lithium content rather than the phosphate, hence we record it under Lithia.

## PUMICE and VOLCANIC ASH

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXV (inc.), XXX-XXXII (inc.). Bulletin 38. U. S. Bureau of Mines, I. G. 6560. (See 'Tufa.')

The production of pumice and volcanic ash in California during the year 1938 amounted to 18,738 short tons valued at \$105,207. This came from five properties each in Inyo and Siskiyou counties; two each in Mono and Napa counties; and one each in Amador, Kern, Madera, and San Luis Obispo counties.

The material from four deposits in Inyo County and that from Mono, Napa, and Siskiyou counties, was 11,297 tons of lump pumice, which was used in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes, and for chicken-house litter. The production in part of one property in Inyo, and that in Amador, Kern, Madera, and San Luis Obispo counties was 7,486 tons of volcanic ash, or tuff variety, and was employed in making soap, cleanser compounds, as a



House built of scoria from Glass Mountain, Siskiyou County.

Photo by H. W. Free

concrete filler in cement displacement, in asphalt, and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

**Pumice Production of California, by Years.**

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909	50	\$500	1925	5,319	\$32,937
1910			1926	7,170	48,350
1911			1927	13,779	168,896
1912	100	2,500	1928	10,440	105,055
1913	3,590	4,500	1929	10,449	76,123
1914	50	1,000	1930	12,947	128,847
1915	350	6,400	1931	11,711	108,130
1916	1,246	18,082	1932	9,891	86,034
1917	525	5,285	1933	8,243	61,067
1918	2,114	28,669	1934	9,961	54,748
1919	2,388	43,657	1935	14,890	87,055
1920	1,537	25,890	1936	17,132	143,709
1921	406	6,310	1937	10,392	79,005
1922	613	4,248	1938	18,783	105,207
1923	2,936	16,309			
1924	4,919	33,404	Totals	171,951	\$1,481,937

**PYRITES**

*Bibliography:* State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1938 came from a single property in Shasta County and showed a decrease in both quantity and value from that of 1937. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

**Pyrites Production in California, by Years.**

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898.....	6,000	\$30,000	1920.....	146,001	\$530,581
1899.....	5,400	28,620	1921.....	110,025	473,735
1900.....	3,642	21,133	1922.....	151,381	570,425
1901.....	4,578	18,429	1923.....	148,004	555,308
1902.....	17,525	60,306	1924.....	124,214	517,835
1903.....	24,311	94,000	1925.....	129,500	528,550
1904.....	15,043	62,992	1926.....	100,896	466,088
1905.....	15,503	63,958	1927.....	130,910	564,823
1906.....	46,689	145,895	1928.....	90,566	400,627
1907.....	82,270	251,774	1929.....	79,169	363,717
1908.....	107,081	610,335	1930.....	39,958	194,228
1909.....	457,867	1,389,802	1931.....	25,402	131,174
1910.....	42,621	179,862	1932.....		
1911.....	54,225	182,954	1933/*.....	72,271	297,832
1912.....	69,872	203,470	1934.....		
1913.....	79,000	218,537	1935/*.....	157,129	547,754
1914.....	79,267	230,058	1936.....		
1915.....	92,462	293,148	1937/*.....	155,107	541,915
1916.....	120,525	372,969	1938.....		
1917.....	111,325	323,704			
1918.....	128,329	425,012			
1919.....	147,024	540,300	Totals.....	3,370,092	\$12,431,900

\* Annual details concealed under 'Unapportioned.'

**SHALE OIL**

*Bibliography:* State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210, Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb. 1925. Min. Congress Jour., Dec. 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flotation oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

**Shale Oil Production of California, by Years**

Year	Barrels	Value
1922/*.....		
1923.....	4,333	\$44,262
1924/*.....		
1925.....	8,688	55,240
1926/*.....		
1927.....	8,819	9,998
1928.....		
Totals.....	21,840	\$109,500

\* Annual details concealed under 'Unapportioned.'

## SILICA (Sand and Quartz)

*Bibliography:* State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI-XXXIII (inc.), XXXV. Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1938 amounted to 63,167 short tons valued at \$278,676 f.o.b. rail-shipping point, and came from two properties in Contra Costa County and one each in Monterey, Orange, Riverside, and San Diego counties. The above was a decrease in both amount and value from the output of 1937 which was 84,313 tons worth \$348,987.

The glass sand came from Contra Costa, Monterey and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County are replacing the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class colorless glass; for such, it must be essentially iron-free. Even a fractional per cent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of \$2 per ton.

**Total Silica Production in California.**

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899	3,000	\$3,500	1920	25,324	\$96,793
1900	2,200	2,200	1921	10,569	49,179
1901	5,000	16,250	1922	9,874	31,016
1902	4,500	12,225	1923	7,964	30,420
1903	7,725	7,525	1924	6,808	35,006
1904	10,004	12,276	1925	12,498	96,780
1905	9,257	8,121	1926	30,010	104,317
1906	9,750	13,375	1927	24,636	94,762
1907	11,065	8,178	1928	14,814	66,679
1908	9,255	22,045	1929	18,686	79,210
1909	12,259	25,517	1930	17,802	71,380
1910	19,224	18,265	1931	43,330	182,769
1911	8,620	8,672	1932	33,997	136,324
1912	13,075	16,404	1933	70,329	266,520
1913	18,618	21,899	1934	70,432	296,643
1914	28,638	22,688	1935	70,835	297,272
1915	28,904	34,322	1936	77,830	310,278
1916	20,880	48,908	1937	84,313	348,987
1917	19,376	41,166	1938	63,167	278,676
1918	23,257	88,930			
1919	18,659	101,600			
			Totals	976,384	\$3,395,077

**SILLIMANITE-ANDALUSITE-CYANITE GROUP**

*Bibliography:* State Mineralogist Reports XX, XXIII, XXIV, XXVII, XXXV. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press. Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates ( $\text{Al}_2\text{SiO}_5$ ), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Cyanite is also an aluminum silicate ( $\text{Al}_2\text{SiO}_5$ ), of the same chemical composition as andalusite and sillimanite, but crystallizing in the triclinic system. A deposit of cyanite is being mined in Imperial County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though differing somewhat in composition from the above, being a basic aluminum silicate ( $\text{HAl}_3\text{BSi}_3\text{O}_{20}$ ), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.



Total Sillimanite Group Production of California, by Years

Year	Tons	Value	Year	Tons	Value
1922}			1931}		
1923}*	4,584	\$98,780	1932}*	1,244	\$21,800
1924}-----			1933}*		
1925}*			1934}*	3,035	69,026
1926}-----	4,810	203,000	1935}*		
1927}*			1936}*	3,112	89,214
1928}-----	4,276	76,000	1937}*		
1929}*			1938}*	2,681	70,477
1930}-----	4,359	198,893	Totals-----	28,101	\$827,200

\* Annual details concealed under 'Unapportioned.'

## SOAPSTONE and TALC

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX, XXXIII-XXXIV. Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1938 amounted to 28,346 short tons valued at \$290,810. This was a decrease in both quantity and values from the 1937 figures, which were 29,657 tons valued at \$347,772. Of the 1938 production 26,811 tons were high-grade talc from Inyo and San Bernardino counties, which material was utilized mainly in toilet powders, paint, paper, for rubber manufacture, and some in ceramics. The remainder of 1,535 tons was soapstone and came from Butte, El Dorado, and Los Angeles counties.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper and part also in magnesite cement.

It is reported that California talc has replaced to some extent imported talc in the toilet trade on the basis of quality. The largest production of talc in the United States comes from Vermont and New York and of massive soapstone from Virginia.

During 1938 imports of talc, steatite, etc., totaled 22,127 short tons valued at \$391,198, as compared with 26,876 tons worth \$472,819 during 1937, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on talc, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

**Talc Production of California, by Years.**

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893.....	400	\$17,750	1917.....	5,267	\$45,279
1894.....			1918.....	11,760	85,534
1895.....	25	375	1919.....	8,764	115,091
1896.....			1920.....	11,327	221,362
1897.....			1921.....	8,752	130,078
1898.....			1922.....	13,378	197,186
1899.....			1923.....	17,439	252,661
1900.....			1924.....	16,179	242,770
1901.....	10	119	1925.....	15,465	239,084
1902.....	14	288	1926.....	17,004	255,645
1903.....	219	10,124	1927.....	16,218	164,744
1904.....	228	2,315	1928.....	18,668	251,372
1905.....	300	3,000	1929.....	18,676	193,493
1906.....			1930.....	15,861	154,258
1907.....			1931.....	13,472	109,940
1908.....	3	48	1932.....	10,690	122,880
1909.....	33	280	1933.....	14,451	153,668
1910.....	740	7,260	1934.....	13,920	158,606
1911.....			1935.....	17,332	170,830
1912.....	1,750	7,350	1936.....	25,643	309,287
1913.....	1,350	6,150	1937.....	29,657	347,772
1914.....	1,000	4,500	1938.....	28,346	290,810
1915.....	1,663	14,750			
1916.....	1,703	9,831	Totals.....	357,707	\$4,395,490

**STRONTIUM**

*Bibliography:* State Mineralogist Report XXVI, XXVII, XXXV, Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

There has been no production of strontium minerals in California since 1918, though in that year both celestite ( $\text{SrSO}_4$ ), and the carbonate, strontianite ( $\text{SrCO}_3$ ) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averaging 80%  $\text{SrCO}_3$  have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value	Year	Tons	Value
1916.....	57	\$2,850	1919.....		
1917.....	3,050	37,000			
1918.....	2,900	33,000	Totals.....	6,007	\$72,850

## SULPHUR

*Bibliography:* State Mineralogist Reports IV, XIII, XIV, XXV. Bulletins 38, 67, 91.

During 1938 there was one producer of sulphur in California, the material coming from Inyo County. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of the single operator. For the two years, 1937-1938, the production totaled 9,451 short tons valued at \$12,010. The 1938 output of sulphur was a decrease from that of 1937. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

**Total Production of Sulphur in California.**

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

Year	Tons	Value	Year	Tons	Value
1865)			1932)		
1866)*-----	941	\$53,500	1933)	1,991	\$32,838
1867)			1934)	4,412	67,656
1868 to 1922-----			1935)*-----	5,308	61,603
1923)	185	4,071	1936)		
1924)			1937)*-----	9,451	120,010
1925 to 1928-----			1938)		
1929)			Totals-----	22,553	\$348,703
1930)*-----	265	9,025			
1931)					

\* Annual details concealed under 'Unapportioned.'

## ZIRCON

*Bibliography:* State Mineralogist Report XXXIV.

During 1938 there were no shipments of zircon sands in California. In 1937 for the first time, zircon was reported in commercial quantities in this State. The Kaufield gold dredge near Lincoln placer recovered considerable zircon from their black sands some of which was shipped for experimental purposes in the manufacture of refractories and for an abrasive in sand blast.

The chief source of zirconium is the mineral zircon, a zirconium silicate,  $\text{ZrSiO}_4$ . Zircon is used, as a gem, being next to the diamond in brilliancy; as a refractory, molds for steel, insulation in electric heating devices, as a coating on other refractories, coating of welding rods, and in the manufacture of other zirconium compounds.

The metal zirconium is used in radio tubes as an alloy in steel, with copper, etc.

## CHAPTER SIX

## SALINES

*Bibliography:* State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.), XXXIII-XXXV (inc.). Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromide, and in 1931 by iodine and in 1938 by the alum minerals. The nitrates are still prospective.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from \$13,216,290 in 1937 to \$14,279,949 in 1938.

The following table gives details for each year:

Substance	1937		1938		Increase + Decrease Value
	Amount	Value	Amount	Value	
Borates.....	326,099 tons	\$6,206,619	276,144 tons	\$5,014,237	\$1,192,382—
Magnesium salts.....	3,867 tons	316,669	24,167 tons	469,636	152,967+
Salt.....	370,431 tons	1,043,611	395,746 tons	1,099,737	56,126+
Soda.....	153,685 tons	1,461,057	178,106 tons	2,023,610	562,553+
Unapportioned.....		\$4,187,600		\$6,672,729	1,485,129+
Total values.....		\$13,216,270		\$14,279,949	
Net increase.....					\$1,063,519

\* Includes bromine, calcium chloride, iodine and potash.

<sup>b</sup> Includes alunogen, bromine, calcium chloride, iodine, and potash.

## ALUM MINERALS

There are several minerals found in California that are considered natural alums. They are hydrous aluminum sulphates combined with sulphates of iron, potassium, sodium or magnesium. The most important are: Alunite,  $K_2Al_6(OH)_{12}(SO_4)_4$ , a basic hydrous aluminum and potassium sulphate, and Alunogen,  $Al_2(SO_4)_3 \cdot 16H_2O$ , an hydrous aluminum sulphate.

In 1938 a small production and some development work was done on an alunogen deposit near Corona, Riverside County. This material was sold as a soil conditioner; being the first recorded commercial production reported in California. The annual details are combined under 'Unapportioned' item to conceal the output of the single operator. An alunite deposit near Glen Ellen, Sonoma County, was opened up several years ago and some development work is being done in hopes of commercializing this mineral.

Alunite and alunogen are used as fertilizers and soil conditioners and are possible sources of the metal aluminum. Alunite can also be utilized as a source of potash and to manufacture alum.

#### BORATES

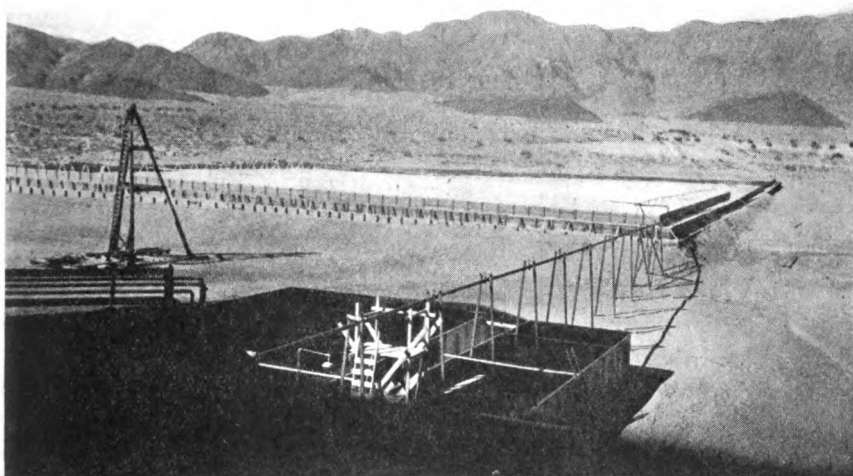
*Bibliography:* State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIX (inc.), XXV-XXVII (inc.), XXXIII-XXXIV. Bulletins 24, 67, 91.

During 1938 there was produced in California a total of 240,899 tons of borate materials compared with 346,487 tons for the year 1937. The material shipped during the year included the new sodium borates, kernite (rasorite), kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely refined into borax of commerce before shipping, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent A.B.A. This is approximately the average A.B.A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1938 production totaled 276,144 tons valued at \$5,014,237. This was a decrease both in quantity and value from the 1937 output, which was 326,099 tons worth \$6,206,619.

The total amount of borates exported from the United States<sup>1</sup> during the year 1938 was 77,519 tons valued at \$2,642,446, as compared with 153,772 tons valued at \$4,708,691 in 1937.



Outside borax storage, American Potash and Chemical Co., at Searles Lake, San Bernardino County.

Photo by Walter W. Bradley

<sup>1</sup> Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1938, Part 1.

**Total Production of Borate Materials in California.**

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer. California is also the premier world source, today.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate, near (probertite) in Kern County. The brines of Searles Lake are also an important source.

The total production of borate materials in California is shown in the following table:

**Total Production of Borate Materials in California**

Year	Tons	Value	Year	Tons	Value
1864.....	12	\$9,478	1903.....	34,430	\$661,400
1865.....	126	94,099	1904.....	45,647	698,810
1866.....	201	132,538	1905.....	46,334	1,019,158
1867.....	220	156,137	1906.....	58,173	1,182,410
1868.....	32	22,384	1907.....	53,413	1,200,913
1869.....			1908.....	22,200	1,117,000
1870.....			1909.....	16,628	1,163,960
1871.....			1910.....	16,828	1,177,960
1872.....	140	89,600	1911.....	50,945	1,456,672
1873.....	515	255,440	1912.....	42,135	1,122,713
1874.....	915	259,427	1913.....	58,051	1,491,530
1875.....	1,168	289,080	1914.....	62,500	1,483,500
1876.....	1,437	312,537	1915.....	67,004	1,663,521
1877.....	993	193,705	1916.....	103,523	2,409,375
1878.....	373	64,257	1917.....	109,944	2,561,958
1879.....	364	65,443	1918.....	88,772	1,867,908
1880.....	609	149,245	1919.....	66,791	1,717,192
1881.....	690	189,750	1920.....	127,065	2,794,206
1882.....	732	201,300	1921.....	50,136	1,096,326
1883.....	900	265,500	1922.....	39,087	1,068,025
1884.....	1,019	198,705	1923.....	62,667	1,893,798
1885.....	942	155,430	1924.....	52,070	1,599,149
1886.....	1,285	173,475	1925.....	46,124	1,526,938
1887.....	1,015	116,689	1926.....	47,605	1,625,298
1888.....	1,405	196,636	1927.....	72,462	3,043,260
1889.....	965	145,473	1928.....	109,722	3,378,552
1890.....	3,201	480,152	1929.....	144,678	3,312,085
1891.....	4,267	640,000	1930.....	209,869	3,686,817
1892.....	5,525	838,787	1931.....	206,405	5,753,037
1893.....	3,955	593,292	1932.....	179,356	2,856,470
1894.....	5,770	807,807	1933.....	197,495	3,019,513
1895.....	5,959	595,900	1934.....	240,696	5,524,262
1896.....	6,754	675,400	1935.....	280,249	4,602,064
1897.....	8,000	1,080,000	1936.....	313,389	5,911,093
1898.....	8,300	1,153,000	1937.....	326,099	6,206,619
1899.....	20,357	1,139,882	1938.....	276,144	5,014,237
1900.....	25,837	1,013,251			
1901.....	22,221	982,380			
1902.....	17,202	2,234,994			
			Totals.....	4,078,042	\$103,880,902

<sup>1</sup> Refined borax,<sup>2</sup> Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

## BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County. The 1938 output showed an increased value and amount as compared with 1937 production; annual details of which are concealed under the 'Unapportioned' item so as not to reveal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

Year	Tons	Value	Year	Tons	Value
1926).....	158	\$120,480	1932).....	559	\$146,547
1927).....			1933).....		
1928).....	802	552,933	1934).....	805	191,465
1929).....			1935).....		
1930).....			1936).....	914	327,823
1931).....			1937).....		
			1938).....		
			Totals.....	3,238	\$1,339,248

\*Annual details concealed under 'Unapportioned.'

## CALCIUM CHLORIDE

*Bibliography:* U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hygroscopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1938 the production of calcium chloride in California came from two plants in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator. The 1938 output showed a decrease in both amount and value as compared with that of 1937.

## Total Calcium Chloride Production in California.

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1921).....	683	\$22,980	1930).....	9,688	\$103,237
1922).....			1931).....		
1923).....	1,204	26,580	1932).....	3,103	15,500
1924).....			1933).....		
1925).....	10,988	328,876	1934).....	4,048	16,196
1926).....			1935).....		
1927).....	34,195	508,748	1936).....	7,227	35,073
1928).....			1937).....		
1929).....	12,020	114,080	1938).....	*	*
			Totals.....	83,156	\$1,171,270

\*Annual details concealed under 'Unapportioned.'

## IODINE

*Bibliography:* State Mineralogist Report XXXIV. U. S. Bureau of Mines I. C. 6387.

In 1936 the output of iodine in California came from two plants in Los Angeles County and showed an increase in both quantity and value over 1935. The annual details for 1936 are concealed under the 'Unapportioned' item to conceal the output of either operator. The combined 1935-1936 production came from three plants in Los Angeles County, and amounted to 487,401 pounds, valued at \$379,702.

**Total Iodine Production in California.**

Iodine was first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

Year	Pounds	Value
1929) * 1931) ----- 1933) ----- 1934) ----- 1935) * 1936) ----- 1937) * 1938) -----	696,297	\$1,374,311
	355,279	423,016
	487,401	379,702
	624,318	508,119
Totals.....	2,163,295	\$2,685,148

\* Annual details concealed under 'Unapportioned.'

## MAGNESIUM SALTS

*Bibliography:* State Mineralogist Reports XX, XXI, XXV-XXVI (inc.), XXXIV. Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1938 there was an output of magnesium salts in California coming from one plant each in Alameda and San Diego counties, and two in San Mateo County. This amounted to 24,176 short tons valued at \$469,636, and consisted of the chloride, carbonate, hydroxide, and oxide. The 1937 output amounted to 3867 tons worth \$316,669, which was also the chloride, carbonate, hydroxide, and oxide. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, a bulky white powder, was used as a heat-insulating material, as a substitute for magnesite, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate market in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitters from the salt plants and was in part marketed in the liquid



form carrying from 35% to 67%  $MgCl_2$  and in part as dry crystals, while that from Alameda and San Mateo counties was magnesium carbonate, magnesium hydroxide, and magnesium oxide, obtained by precipitation from sea water.

The average value reported for the chloride produced in California in 1938 was approximately \$28.30 per ton, f.o.b. plant, and in 1937 approximately \$29.69 per ton, f.o.b. plant.

#### Total Production of Magnesium Salts in California.

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1916.....	851	\$6,407	1929.....	4,914	\$333,906
1917.....	1,064	34,973	1930.....		
1918.....	1,008	29,955	1931.....	2,749	217,979
1919.....	1,616	82,457	1932.....	2,073	159,660
1920.....	3,150	107,787	1933.....	2,325	194,642
1921.....	4,153	106,140	1934.....	2,785	235,531
1922.....	3,036	89,788	1935.....	3,798	347,838
1923.....	3,662	116,031	1936.....	3,867	316,669
1924.....	4,823	145,883	1937.....	24,176	469,636
1925.....	4,221	132,553	1938.....		
1926.....	4,881	124,470			
1927.....					
1928.....	6,241	139,589	Totals.....	85,393	\$3,391,894

\* Annual details concealed under 'Unapportioned.'

#### NITRATES

*Bibliography:* State Mineralogist Reports XV, XXV, XXVI, XXVII. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydroelectric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the power. Sodium and potassium cyanides can be made by fixation of atmospheric nitrogen electrically.

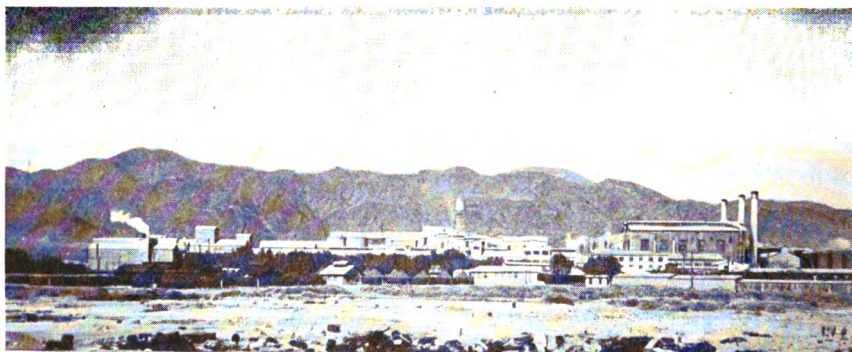
## POTASH

*Bibliography:* State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXVII (inc.), XXXIV. Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1938 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent  $K_2O$  content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts in the United States during 1937 according to the U. S. Bureau of Foreign and Domestic Commerce amounted to 379,486 long tons, valued at \$9,856,201, compared with 701,472 long tons worth \$16,794,981 in 1937. These materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations have recently ranged from \$36.25 per ton c.i.f. Atlantic and Gulf ports for high grade sulphate (90%-95%), and \$16.50 for manure salts (30%).



Plant of American Potash and Chemical Co., at Trona on Searles Lake, San Bernardino County.

Photo by Walter W. Bradley

#### Total Production of Potash in California.

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitters, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

Year	Tons	Value	Year	Tons	Value
1914.....	10	\$460	1927.....	67,340	\$1,952,852
1915.....	1,076	19,391	1928.....	178,680	5,522,350
1916.....	17,808	663,605	1929.....		
1917.....	129,022	4,202,889	1930.....	172,263	5,500,536
1918.....	49,351	6,508,976	1931.....		
1919.....	28,118	2,415,963	1932.....	153,147	3,932,721
1920.....	26,298	1,466,463	1933.....		
1921.....	14,806	390,210	1934.....	355,604	3,750,809
1922.....	17,776	584,388	1935.....		
1923.....	29,597	709,836	1936.....	358,417	6,988,922
1924.....	33,107	747,407	1937.....		
1925.....	36,355	829,770	1938.....		
1926.....	32,884	812,285			
			Totals.....	1,600,789	\$46,304,833

\* Annual details concealed under 'Unapportioned.'

### SALT

*Bibliography:* State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII (inc.), XXXIV-XXXV. Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County, and from a mineral spring in Butte County.

During 1938 there was an output in California of 395,746 tons of salt worth \$1,099,737, compared with 370,431 tons worth \$1,044,325 in 1937. There were twelve companies operating plants in 1938; two in San Bernardino County and one each in Alameda, Butte, Imperial, Kern, Los Angeles, Modoc, Monterey, Orange, San Diego, and San Mateo.

The average value reported for salt produced in California during 1938 was \$2.78 per ton f.o.b. plant, compared with \$2.82 in 1937; \$3.08 in 1936; \$3.36 in 1935; \$3.68 in 1934; and \$3.89 in 1933.

#### Production of Salt in California, by Years.

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887.....	28,000	\$112,000	1914.....	223,806	\$583,553
1888.....	30,800	92,400	1915.....	169,028	368,737
1889.....	21,000	63,000	1916.....	186,148	455,695
1890.....	8,729	57,085	1917.....	227,825	584,373
1891.....	20,094	90,303	1918.....	212,076	806,328
1892.....	23,570	104,788	1919.....	233,994	896,963
1893.....	50,500	213,000	1920.....	230,638	972,648
1894.....	49,131	140,087	1921.....	197,989	832,702
1895.....	53,031	150,576	1922.....	223,238	819,187
1896.....	64,743	153,244	1923.....	275,979	1,130,670
1897.....	67,851	157,520	1924.....	318,800	1,159,137
1898.....	93,421	170,855	1925.....	284,068	949,626
1899.....	82,654	149,588	1926.....	311,761	1,124,978
1900.....	89,338	204,754	1927.....	263,028	639,127
1901.....	126,218	366,376	1928.....	340,580	1,024,656
1902.....	115,208	205,876	1929.....	392,039	2,665,436
1903.....	102,895	211,365	1930.....	347,945	1,167,487
1904.....	95,968	187,300	1931.....	330,951	1,233,567
1905.....	77,118	141,925	1932.....	256,353	918,480
1906.....	101,650	213,228	1933.....	321,312	1,251,024
1907.....	88,063	310,967	1934.....	332,194	1,222,610
1908.....	121,764	281,469	1935.....	365,711	1,230,480
1909.....	155,680	414,708	1936.....	398,249	1,227,505
1910.....	174,920	395,417	1937.....	370,431	1,044,325
1911.....	173,332	324,255	1938.....	395,746	1,099,737
1912.....	185,721	383,370			
1913.....	204,407	462,681	Totals.....	9,614,695	\$31,167,568

#### SODA

*Bibliography:* State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.), XXXIV. Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1938 included soda ash, trona, and bicarbonates from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona (sesqui-carbonate, a double salt of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$ ) from Searles Lake, San Bernardino County. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County.

The output for 1938 amounted to 178,105 tons valued at \$2,023,610, as compared with 153,105 tons worth \$1,461,057 in 1937.

The dense ash and bicarbonate were used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes.

**Soda Production of California, by Years.**

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894	1,530	\$20,000	1918	20,447	\$855,423
1895	1,900	47,500	1919	21,294	721,968
1896	3,000	65,000	1920	32,407	1,104,888
1897	5,000	110,000	1921	14,828	438,990
1898	7,000	154,000	1922	20,084	573,661
1899	10,000	250,000	1923	34,585	764,284
1900	1,000	50,000	1924	32,536	711,796
1901	8,000	400,000	1925	48,625	947,649
1902	7,000	50,000	1926	63,333	1,305,802
1903	18,000	27,000	1927	62,571	1,478,239
1904	12,000	18,000	1928	80,538	1,469,297
1905	15,000	22,500	1929	90,646	1,838,657
1906	12,000	18,000	1930	90,122	1,627,344
1907			1931	78,701	1,217,811
1908	9,600	14,400	1932	58,017	826,369
1909	7,712	11,593	1933	70,568	1,019,130
1910	8,125	11,862	1934	99,380	1,219,561
1911	9,023	52,887	1935	125,504	1,341,045
1912	7,200	37,094	1936	144,314	1,412,788
1913	1,861	24,936	1937	153,685	1,461,067
1914	6,522	115,396	1938	178,105	2,023,610
1915	5,799	83,485			
1916	10,583	264,625			
1917	24,505	928,578	Totals	1,813,290	\$27,196,431

## CHAPTER SEVEN

## BY COUNTIES

**Introductory.**

The State of California includes a total area of 158,297 square miles, of which 155,652 square miles are of land. The maximum width is 235 miles, the minimum 148 miles, and the length from the north-west corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1930 census figures show a total population for California of 5,672,009. Minerals of commercial value exist in every county, and during 1936 some active production was reported to the State Division of Mines from all of the fifty-eight.

**Rank of Counties in Mineral Yield, 1938.**

Of the ten leading counties in point of total value of mineral output for 1938, the first five, viz., Los Angeles, Kern, Fresno, Ventura and Orange; also Kings seventh and Santa Barbara ninth, owe their position to petroleum and natural gas. Los Angeles County, due to crude oil, led all other counties in 1938 and is credited with 35% of the State's total mineral value, holding this position since 1923 when it passed Kern, which previously led the State for many years. San Bernardino (sixth) owes its position to cement, borates, and potash. Nevada (eighth) owes its position to gold; and Sacramento (tenth) to gold.

There were twenty-eight counties having a mineral production valued in excess of a million dollars in 1938, in seven of which petroleum was an important item; in seventeen gold; in six each, natural gas and cement; in two, borates and miscellaneous stone; and in one each potash and soda, diatomite.

In point of variety and diversity San Bernardino County led all others in 1938 with twenty-seven different mineral substances on its commercial list; followed by Los Angeles County with twenty-three; Inyo County with nineteen; Fresno and Kern counties each with seventeen; Riverside County with sixteen; San Diego County with fourteen; Orange, San Luis Obispo, and Santa Barbara counties each with thirteen; Butte, El Dorado, and Placer counties each with twelve; Imperial, Monterey, and Santa Clara counties each with eleven; and Calaveras, Shasta, Siskiyou, and Tuolumne counties each with ten.

No.	County	Value	No.	County	Value
1	Los Angeles.....	\$125,027,054	31	Stanislaus.....	\$845,523
2	Kern.....	71,528,574	32	San Joaquin.....	781,907
3	Fresno.....	30,159,518	33	Napa.....	637,963
4	Ventura.....	21,966,416	34	Santa Clara.....	624,463
5	Orange.....	21,601,082	35	Imperial.....	604,227
6	San Bernardino.....	16,752,866	36	San Diego.....	535,722
7	Kings.....	15,410,575	37	San Benito.....	527,192
8	Nevada.....	11,667,896	38	Solano.....	431,677
9	Santa Barbara.....	10,683,722	39	Mono.....	349,516
10	Sacramento.....	5,467,487	40	Lake.....	281,098
11	Calaveras.....	4,357,938	41	Tulare.....	273,199
12	Amador.....	3,880,444	42	San Luis Obispo.....	242,500
13	Riverside.....	3,306,793	43	Sonoma.....	232,495
14	Merced.....	2,867,501	44	Marin.....	189,843
15	Yuba.....	2,633,138	45	Monterey.....	187,144
16	Alameda.....	2,531,600	46	Humboldt.....	97,181
17	El Dorado.....	2,207,099	47	Tehama.....	81,431
18	Butte.....	2,177,265	48	Glenn.....	60,138
19	Contra Costa.....	2,116,285	49	Lassen.....	59,546
20	San Mateo.....	2,026,217	50	Yolo.....	48,232
21	Placer.....	2,020,042	51	Mendocino.....	46,378
22	Santa Cruz.....	1,907,188	52	San Francisco.....	33,607
23	Shasta.....	1,791,727	53	Madera.....	29,916
24	Mariposa.....	1,588,861	54	Sutter.....	28,973
25	Inyo.....	1,583,893	55	Del Norte.....	15,997
26	Siskiyou.....	1,510,815	56	Alpine.....	11,123
27	Trinity.....	1,493,132	57	Modoc.....	5,896
28	Tuolumne.....	1,130,263	58	Colusa.....	2,884
29	Sierra.....	905,237			
30	Plumas.....	878,277		Total value.....	\$380,444,976

## ALAMEDA

*Land area:* 732 square miles.

*Population:* 475,153 (1930 census).

*Location:* East side of San Francisco Bay.

*County seat:* Oakland.

*References:* State Mineralogist Report XVII : XVIII : XX : XXVI (Oct., 1929).

Alameda, while in no sense one of the 'mining counties,' came sixteenth on the list of counties as to value, with a mineral production for 1938 worth \$2,531,600, and had nine different substances. This was an increase over the 1937 output which was valued at \$2,476,302.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery).....	5,244 tons	\$5,532
Miscellaneous stone.....		1,141,554
Unapportioned*.....		1,384,514
Total value.....		\$2,531,600

\*Includes brick and hollow building-tile, bromine, gypsum as a by-product of chemical reduction of other minerals from sea water (value not included in total), lime, magnesium salts, salt.

**ALPINE**

*Land area:* 776 square miles.

*Population:* 236 (1930 census).

*Location:* On eastern border of State, south of Lake Tahoe.

*County seat:* Markleeville.

*References:* State Mineralogist Report XV : XVII : XVIII : XXVII (Oct., 1931).

Alpine County ranked fifty-sixth in value of output for 1938, which was \$11,123, compared with \$22,791 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$35
Silver.....	167 fine oss.	108
Miscellaneous stone.....		10,980
Total value.....		\$11,123

**AMADOR**

*Land area:* 601 square miles.

*Population:* 8494 (1930 census).

*Location:* East-central part of State—Mother Lode District.

*County seat:* Jackson.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII : (April, 1927) : XXX.

Amador County ranked twelfth as to value of mineral output for 1938, with nine different substances worth \$3,880,440, compared with \$3,917,866 in 1937.

Amador at one time led the State in gold production, though exceeded in 1920-1923 and in 1926-1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929-1930 and 1937 by Nevada only, and in 1931-1936 and 1938 by Nevada and Sacramento.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery).....	42,679 tons	\$73,422
Copper.....	5,152 lbs.	505
Gold.....		3,724,840
Silver.....	22,536 fine oss.	14,569
Miscellaneous stone.....		6,027
Unapportioned*.....		61,081
Total value.....		\$3,880,444

\* Includes brick, coal, lead, volcanic ash.



**BUTTE**

*Land area:* 1722 square miles.

*Population:* 34,010 (1930 census).

*Location:* North-central portion of State.

*County seat:* Oroville.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XXIV : XXVI (Oct., 1930) : XXXI (Jan., 1936).

Butte County ranked eighteenth in regard to value of mineral output in 1938 and eighth in respect to gold, with twelve different substances, having a total value of \$2,177,265 compared with \$1,798,992 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$1,882,370
Silver.....	30,425 fine oss.	19,669
Miscellaneous stone.....		270,871
Unapportioned*.....		4,355
<b>Total value.....</b>		<b>\$2,177,265</b>

\* Includes copper, lead, limestone, mineral water, natural gas, platinum, salt, soapstone.

**CALAVERAS**

*Land area:* 1027 square miles.

*Population:* 6009 (1930 census).

*Location:* East-central portion of State—Mother Lode District.

*County seat:* San Andreas.

*References:* State Mineralogist Report XIV : XVII : XVIII :  
XIX : XX : XXI : XXXII (July, 1936).

Calaveras County ranked eleventh in California in regard to value of mineral output in 1938, fifth in respect to gold, with a total of \$4,357,938, as compared with \$3,279,250 in 1937.

Commercial production for 1938 consisting of ten different substances, was as follows:

Substance	Amount	Value
Copper.....	25,374 lbs.	\$2,487
Gold.....		2,906,225
Lead.....	1,583 lbs.	73
Silver.....	17,651 fine oss.	11,411
Miscellaneous stone.....		38,991
Unapportioned*.....		1,398,751
<b>Total value.....</b>		<b>\$4,357,938</b>

\* Unapportioned includes cement, clay (pottery), mineral water, platinum.

**COLUSA**

*Land area:* 1140 square miles.

*Population:* 10,257 (1930 census).

*Location:* Sacramento Valley.

*County seat:* Colusa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXV : (April, 1929).

Colusa County ranked fifty-eighth in regard to the value of mineral output in 1938 with two different mineral substances, worth a total of \$2,884, as compared with \$9,424 in 1937.

Commercial production for 1938 included mineral water and miscellaneous stone.

**CONTRA COSTA**

*Land area:* 714 square miles.

*Population:* 78,554 (1930 census).

*Location:* East side of San Francisco Bay.

*County seat:* Martinez.

*References:* State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927).

Contra Costa County stands nineteenth on the list in respect to value of mineral output for 1938, with nine different substances worth \$2,116,285, as compared with \$1,867,309 in 1937.

Commercial production for 1938 was as follows:

Substance	Value
Brick and hollow building tile.....	\$483,961
Miscellaneous stone.....	433,644
Unapportioned*.....	1,198,680
Total value.....	\$2,116,285

\* Includes cement, clay (pottery), mineral water, quicksilver, silica (glass sand).

**DEL NORTE**

*Land area:* 1024 square miles.

*Population:* 4734 (1930 census).

*Location:* Extreme northwest corner of State.

*County seat:* Crescent City.

*References:* State Mineralogist Report XIV : XVII : XXI (July, 1925) : XXIX (Jan.-April, 1933) : XXXIV.

Del Norte County was in fifty-fifth place as to mineral production for 1938 with four different substances worth \$15,296, as compared with \$30,647 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$700
Silver.....	2 fine ozs.	1
Miscellaneous stone.....		15,296
Total value.....		\$15,997

### EL DORADO

*Land area:* 1753 square miles.

*Population:* 8303 (1930 census).

*Location:* East-central portion of the State, northernmost of the Mother Lode counties.

*County seat:* Placerville.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI : XXXIV (July, 1938).

El Dorado, which contains the location where gold in California was first heralded to the world, comes seventeenth on the list of counties ranked according to value for 1938, with twelve different mineral substances worth \$2,207,099. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's total for cement. The 1937 output was valued at \$2,607,972.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	40,535 lbs.	\$3,972
Gold.....		1,484,805
Limestone.....	135,142 tons	304,420
Silver.....	8,844 fine ozs.	5,717
Miscellaneous stone.....		64,202
Unapportioned*		343,983
Total value.....		\$2,207,099

\* Includes chromite, lead, lime, mineral water, slate, soapstone.

### FRESNO

*Land area:* 5950 square miles.

*Population:* 144,369 (1930 census).

*Location:* South-central portion of State.

*County seat:* Fresno.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXV (July, 1929).

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1938 of seventeen different mineral substances, with a total value of \$30,159,518, as compared with the 1937 value of \$41,178,791.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$10,955
Natural gas.....	58,337,848 Mcu.ft.	3,626,724
Petroleum.....	20,784,106 bbls.	26,201,849
Silver.....	54 fine oss.	35
Miscellaneous stone.....		224,869
Unapportioned*.....		95,086
Total value.....		\$30,159,518

\* Includes brick and hollow building tile, chromite, feldspar, gems (topaz), granite, gypsum, limestone (marl), mineral water, quicksilver, tungsten ore, clay (pottery).

#### GLENN

*Land area:* 1259 square miles.

*Population:* 10,935 (1930 census).

*Location:* West side of Sacramento Valley.

*County seat:* Willows.

*References:* State Mineralogist Report XIV : XVII : XVIII.

Glenn County stands forty-eighth as a mineral producing county of the State for 1938 and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1938 totaled \$60,138, which is a decrease from \$136,368, the 1937 total.

#### HUMBOLDT

*Land area:* 3634 square miles.

*Population:* 43,189 (1930 census).

*Location:* Northwestern portion of State, bordering on Pacific Ocean.

*County seat:* Eureka.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925).

Humboldt County ranked forty-sixth in the value of its mineral output among the counties of the State for 1938, with eight different mineral substances valued at \$97,181, compared with the 1937 output worth \$100,715.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$20,825
Silver.....	89 fine oss.	58
Miscellaneous stone.....		73,705
Unapportioned*.....		2,593
Total value.....		\$97,181

\* Includes brick, clay (pottery), natural gas, platinum.

**IMPERIAL**

*Land area:* 4089 square miles.

*Population:* 60,894 (1930 census).

*Location:* Extreme southeast corner of the State.

*County seat:* El Centro.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926) : XXXIV.

Imperial County ranked thirty-fifth in total value of mineral output for 1938, with eleven different mineral substances, worth \$604,227, compared with \$677,401 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	70,000 lbs.	\$6,880
Gold.....		448,490
Silver.....	4,331 fine oss.	2,800
Miscellaneous stone.....		60,871
Unapportioned*.....		87,206
Total value.....		\$604,227

\* Includes carbon dioxide, gems (Iceland spar), gypsum, mica, salt, kyanite.

**INYO**

*Land area:* 10,019 square miles.

*Population:* 6557 (1930 census).

*Location:* Lies on eastern border of State, north of San Bernardino County.

*County seat:* Independence.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII : XXX : XXXIII : XXXIV (Oct., 1938).

Inyo County's mineral output for 1938 reached a total value of \$1,583,893, having nineteen different mineral substances and standing twenty-fifth amount the counties of the State as to value of production. The 1937 yield was worth \$1,439,009.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	65,844 lbs.	\$6,453
Gold.....		625,240
Lead.....	322,004 lbs.	14,812
Pumice and volcanic ash.....	2,061 tons	19,922
Talc.....	18,581 tons	194,588
Silver.....	41,118 fine oss.	26,581
Miscellaneous stones.....		32,026
Unapportioned*.....		664,271
Total value.....		\$1,583,893

\* Includes borates, dolomite, garnets, iron ore, limestone, onyx, quicksilver, slate, soda, sulphur, tungsten ore.

**KERN**

*Land area:* 8003 square miles.

*Population:* 82,219, (1930 census).

*Location:* South-central portion of State.

*County seat:* Bakersfield.

*References:* State Mineralogist Report XIV : XVII : XVIII :  
XIX : XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) :  
XXX.

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1938, for which petroleum is responsible; it also rates fourth as a gold producing county. The 1938 production consisted of seventeen different mineral substances valued at \$71,528,574, compared with the 1937 output worth \$74,162,134.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery and rotary drilling mud) .....	38,910 tons	\$64,821
Gold .....		3,034,605
Lead .....	6,994 lbs.	322
Natural gas .....	68,974,794 M. cu.ft.	4,244,887
Petroleum .....	66,013,496 bbls.	58,803,255
Silver .....	1,148,177 fine oss.	742,256
Miscellaneous stone .....		240,750
Unapportioned* .....		4,397,668
Total value .....		\$71,528,574

\* Includes borates, brick, calcium silicate, cement, volcanic ash, quicksilver, salt, copper.

**KINGS**

*Land area:* 1559 square miles.

*Population:* 25,277 (1930 census).

*Location:* South-central portion of the State.

*County seat:* Hanford.

*References:* State Mineralogist Report XIV : XVII : XVIII :  
XXVI (Oct., 1930).

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked ninth in total value of annual mineral production, seventh in 1930 and 1938, third in 1931, and eighth in 1936-1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Natural gas .....	53,242,662 M. cu.ft.	\$3,290,978
Petroleum .....	8,717,827 bbls.	12,117,779
Unapportioned* .....		2,118
Total value .....		\$15,410,875

\* Includes quicksilver and miscellaneous stone.

## LAKE

*Land area:* 1278 square miles.

*Population:* 7166 (1930 census).

*Location:* About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.

*County seat:* Lakeport.

*References:* State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929) : XXXIV.

Lake County was in fortieth place as to the value of mineral output for 1938, with three different mineral substances, worth \$281,-098, compared with \$392,585 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Mineral water.....	26,560 gals.	\$12,770
Quicksilver.....	3,718 flasks	265,430
Miscellaneous stone.....		2,898
Total value.....		\$281,098

## LASSEN

*Land area:* 4531 square miles.

*Population:* 12,587 (1930 census).

*Location:* Northeast portion of State.

*County seat:* Susanville.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in forty-ninth place as a mineral producer for 1938, with an output of \$59,546, compared with \$86,240 which was the value for the previous year.

Commercial production for 1938 was as follows:

Substance	Value
Miscellaneous stone.....	\$59,118
Unapportioned.....	428
Total value.....	\$59,546

\* Includes granite, gold, silver.

## LOS ANGELES

*Land area:* 4067 square miles.

*Population:* 2,201,526 (1930 census).

*Location:* One of the southwestern coast counties.

*County seat:* Los Angeles.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIII (July, 1937) : XXXIV.

The mineral production for Los Angeles County for the year 1938 amounted in value to \$125,027,054, as compared with the 1937 output worth \$100,337,635. This accounted for 35% of the entire State's

total for 1938 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1938, consisting of twenty-three substances, was as follows:

Substance	Amount	Value
Brick.....	60,367 M.	\$1,206,092
Hollow building tile.....	3,022 tons	31,141
Clay (pottery).....	30,766 tons	55,605
Copper.....	2,128 lbs.	209
Gold.....		171,710
Mineral water.....	8,398,855 gals.	349,028
Natural gas.....	73,790,818 M. cu. ft.	5,451,390
Petroleum.....	106,545,794 bbls.	113,407,606
Silver.....	1,887 fine oss.	1,220
Stone, miscellaneous.....		3,836,394
Unapportioned*.....		516,659
Total value.....		\$125,027,054

\* Includes bentonite, diatomite, dolomite, granite (mica schist), iodine, limestone, marble (lime rock building stone) salt, slate, soapstone, lead.

### MADERA

*Land area:* 2112 square miles.

*Population:* 17,152 (1930 census).

*Location:* East-central portion of State.

*County seat:* Madera.

*References:* State Mineralogist Report XIV : XVII : XVII : XXIV (Oct., 1928) : XXX : XXXI.

Madera County was in fifty-third place as a mineral producer for 1938, with an output of four different mineral substances valued at \$29,916, compared with \$133,165 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$9,485
Silver.....	86 fine oss.	56
Miscellaneous stone.....		2,875
Other minerals.....		17,500
Total value.....		\$29,916

### MARIN

*Land area:* 529 square miles.

*Population:* 41,635 (1930 census).

*Location:* Adjoins San Francisco on the north.

*County seat:* San Rafael.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXIX.

Marin County had forty-fourth place as to the value of mineral output for 1938, with four different mineral substances. The total was 189,843, compared with \$300,204 in 1937.

Commercial production for 1938 included pottery clay, mineral water, and miscellaneous stone.



**MARIPOSA**

*Land area:* 1453 square miles.

*Population:* 2530 (1930 census).

*Location:* Most southerly of the Mother Lode counties. East central portion of State.

*County seat:* Mariposa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXIV (April 1928) : XXXI (Jan., 1935).

Mariposa County is one of the distinctly 'mining' counties of the State, although it stands but twenty-fourth on the list of counties in regard to the value of its mineral output for 1938, with a total of \$1,588,861, as compared with \$1,270,774 for 1937. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production with eight different mineral substances, for 1938 was as follows:

Substance	Amount	Value
Copper.....	4,328 lbs.	\$424
Gold.....		1,081,815
Silver.....	7,973 fine oss.	5,154
Miscellaneous stone.....		282,030
Unapportioned*.....		219,438
<b>Total value.....</b>		<b>\$1,588,861</b>

\* Includes barite, lead, granite.

**MENDOCINO**

*Land area:* 3452 square miles.

*Population:* 23,491 (1930 census).

*Location:* Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.

*County seat:* Ukiah.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX.

Mendocino County's mineral output for 1938 was valued at \$46,378 which gave it a rank of fifty-first among the counties of the State as a mineral producer with \$114,705 for 1937.

Commercial production for 1938 included natural gas and miscellaneous stone.

**MERCED**

*Land area:* 1995 square miles.

*Population:* 36,900 (1930 census).

*Location:* About the geographical center of the State.

*County seat:* Merced.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan., 1935).

Merced County ranked fourteenth as to the value of mineral output for 1938, with six different substances worth \$2,867,501, compared with \$2,535,126 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$2,090,340
Silver.....	5,859 fine ozs.	3,788
Miscellaneous stone.....		139,637
Other minerals.....		633,736
Total value.....		\$2,867,501

### MODOC

*Land area:* 3823 square miles.

*Population:* 8038 (1930 census).

*Location:* The extreme northeast corner of the State.

*County seat:* Alturas.

*References:* State Mineralogist Report XV : XVII : XVIII : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Modoc County, in fifty-seventh place for 1938, with seven different mineral substances, reported a commercial production as follows:

Substance	Value
Miscellaneous stone.....	\$4,329
Unapportioned*.....	1,567
Total value.....	\$5,896

\* Includes gems (iridescent obsidian), mineral water, salt, gold, silver.

### MONO

*Land area:* 3030 square miles.

*Population:* 1359 (1930 census).

*Location:* Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.

*County seat:* Bridgeport.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXIII (Oct., 1927) : XXX : XXXIV.

Mono County, in thirty-ninth place with nine different mineral substances, reported a commercial production for 1938 as follows:

Substance	Amount	Value
Copper.....	3,050 lbs.	\$299
Gold.....		117,390
Lead.....	6,039 lbs.	278
Silver.....	220,978 fine ozs.	142,854
Miscellaneous stone.....		4,121
Unapportioned*.....		84,574
Total value.....		\$349,516

\* Includes clay (pottery), pumice, andalusite, tungsten ore.

**MONTEREY**

*Land area:* 3330 square miles.

*Population:* 53,668 (1930 census).

*Location:* West-central portion of State, bordering on Pacific Ocean.

*County seat:* Salinas.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Jan., 1925) : XXXI : XXXIV.

Monterey County eleven different mineral substances during 1938, having a total value of \$187,144, as compared with \$262,651 for 1937.

In forty-fifth place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$2,135
Silver.....	5 fine oss.	3
Miscellaneous stone.....		151,888
Unapportioned*.....		33,118
<b>Total value.....</b>		<b>\$187,144</b>

\* Includes diatomite, gems (jasper), natural gas, quicksilver, salt, sandstone, silica (glass sand).

**NAPA**

*Land area:* 783 square miles.

*Population:* 22,832 (1930 census).

*Location:* Directly north of San Francisco Bay—one of the 'bay counties.'

*County seat:* Napa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929).

In 1938 the value of Napa County's mineral output was \$637,963, placing it in thirty-third place on the list of counties, as compared with \$356,146 for 1937.

With nine different mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	4,450 lbs.	\$436
Gold.....		64,280
Mineral water.....	53,152 gals.	9,658
Quicksilver.....	694 flasks	46,403
Silver.....	148,337 fine oss.	95,895
Unapportioned*.....		421,311
<b>Total value.....</b>		<b>\$637,963</b>

\* Includes pumice, sandstone, miscellaneous stone.

## NEVADA

*Land area:* 974 square miles.

*Population:* 10,589 (1930 census).

*Location:* North of Lake Tahoe on the eastern border of the State.

*County seat:* Nevada City.

*References:* State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII.

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918-1921, also 1923. In 1922, 1924, 1929 to 1938, Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands eighth on the list of counties in regard to value of its mineral output for 1938, with nine different mineral substances worth \$11,667,896, as compared with \$11,385,056 for 1937. The increase was due to gold.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	124,058 lbs.	\$12,158
Gold.....		11,261,530
Lead.....	286,396 lbs.	13,174
Silver.....	505,156 fine oss.	326,565
Miscellaneous stone.....		44,758
Unapportioned*		9,711
Total value.....		\$11,667,896

\* Includes barite, granite, platinum.

## ORANGE

*Land area:* 795 square miles.

*Population:* 118,611 (1930 census).

*Location:* Southwest poriton of the State, bordering Pacific Ocean.

*County seat:* Santa Ana.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI.

Orange County, in fifth place as to value of mineral output for 1938, produced thirteen mineral substances, worth \$21,601,082, as compared with \$22,659,380 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery).....	22,522 tons	\$89,954
Gold.....		245
Natural gas.....	20,551,546 M. cu.ft.	1,510,990
Petroleum.....	20,667,775 bbls.	19,768,434
Silver.....	682 fine oss.	441
Miscellaneous stone.....		201,444
Unapportioned*		29,574
Total value.....		\$21,601,082

\* Includes brick, lead, quicksilver, salt, silica (glass sand), copper.

**PLACER**

*Land area:* 1395 square miles.

*Population:* 24,442 (1930 census).

*Location:* Eastern border of State directly west of Lake Tahoe.

*County seat:* Auburn.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1937) : XXXI : XXXII (Jan., 1936).

Placer County in twenty-first place, with twelve different mineral substances, had a commercial production for 1938 as follows, compared with \$1,754,040 for the previous year:

Substance	Amount	Value
Clay (pottery).....	60,708 tons	\$95,337
Copper.....	7,704 lbs.	755
Gold.....		1,805,965
Lead.....	15,300 lbs.	704
Silver.....	43,226 fine oss.	27,944
Miscellaneous stone.....		54,148
Unapportioned*.....		45,189
<b>Total value.....</b>		<b>\$2,020,042</b>

\* Includes brick and hollow building tile, chromite, granite, mineral water, platinum.

**PLUMAS**

*Land area:* 2594 square miles.

*Population:* 7909 (1930 census).

*Location:* Northeastern border of State, south of Lassen County.

*County seat:* Quincy.

*References:* State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIII (April, 1937).

Plumas County's mineral output for 1938 with seven different mineral substances, was valued at \$878,277, as compared with \$2,354,957 for 1937.

In thirtieth place, commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	1,202,974 lbs.	\$117,891
Gold.....		698,110
Lead.....	2,276 lbs.	105
Silver.....	53,927 fine oss.	34,862
Miscellaneous stone.....		27,159
Other minerals.....		150
<b>Total value.....</b>		<b>\$878,277</b>

## RIVERSIDE

*Land area:* 7240 square miles.

*Population:* 82,078 (1930 census).

*Location:* Southern portion of State.

*County seat:* Riverside.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XX : XXV (Oct., 1929) : XXX : XXXI : XXXIV.

Riverside is the fourth county in the State in size and the thirteenth in regard to the total value of mineral output for 1938. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed sixteen different mineral substances commercially produced in 1938 with a total value of \$3,306,793, compared with the 1937 output which was valued at \$4,057,127.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Clay (pottery) .....	47,977 tons	\$87,489
Gold .....		77,000
Copper .....	15,044 lbs.	1,479
Lead .....	241,510 lbs.	11,109
Silver .....	5,238 fine oss.	3,387
Miscellaneous stone .....		319,796
Unapportioned* .....		2,806,533
Total value .....		\$3,306,793

\* Includes alunogen, brick and hollow building tile, cement, granite, gypsum, limestone, mineral water, silica (glass sand), paving block.

## SACRAMENTO

*Land area:* 983 square miles.

*Population:* 141,915 (1930 census).

*Location:* North-central portion of State.

*County seat:* Sacramento.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XX : XXI (Jan., 1925) : XXXI.

Sacramento stands tenth among the counties of the State as a mineral producer; the output, principally gold, for 1938 being valued at \$5,467,487, as compared with the 1937 production worth \$4,230,689. In regard to gold output alone, this county ranks second, being exceeded by Nevada, the Sacramento product coming from the dredges. With nine mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold .....		\$4,973,640
Silver .....	6,236 fine oss.	4,031
Miscellaneous stone .....		376,159
Unapportioned* .....		113,657
Total value .....		\$5,467,487

\* Includes brick and hollow building tile, granite, natural gas, platinum, paving block.

**SAN BENITO**

*Land area:* 1392 square miles.

*Population:* 11,310 (1930 census).

*Location:* West-central portion of State.

*County seat:* Hollister.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XX : XXII (April, 1926) : XXXIV.

San Benito County ranked thirty-seventh among the counties in regard to the value of total mineral production for 1938, having an output worth \$527,192, as compared with \$504,510 for the previous year.

Commercial production for 1938 included bentonite, coal, dolomite, quicksilver, miscellaneous stone.

**SAN BERNARDINO**

*Land area:* 20,157 square miles.

*Population:* 133,827 (1930 census).

*Location:* Southeastern portion of State.

*County seat:* San Bernardino.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX :  
XXXIV.

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1938, with a total of \$16,752,866, as compared with the 1937 total of \$16,012,330.

San Bernardino, for several years (except for 1918) has led all other counties in the State in point of variety of minerals, producing commercially in 1938 a total of twenty-seven different substances.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Bentonite.....	8,504 tons	\$108,850
Clay (pottery).....	3,651 tons	26,249
Copper.....	24,723 lbs.	2,423
Gold.....		409,290
Lead.....	88,888 lbs.	4,089
Silver.....	257,370 fine oss.	166,381
Miscellaneous stone.....		279,518
Unapportioned*.....		15,756,066
<b>Total value.....</b>		<b>\$16,752,866</b>

\* Includes borates, brick, calcium chloride, cement, granite, iron ore, lithia, lime, limestone, onyx, mineral water, petroleum, potash, silica ('ganister' used in brick), salt, serpentine, soda, tungsten ore, zinc.

## SAN DIEGO

*Land area:* 4221 square miles.

*Population:* 209,477 (1930 census).

*Location:* Extreme southwest corner of State.

*County seat:* San Diego.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925) : XXX : XXXV (Jan., 1939).

San Diego County ranked thirty-sixth in the total value of its mineral output for the year 1938 with fourteen different mineral substances on the commercial list. The value for 1938 was \$535,722 as compared with the 1937 output worth \$591,479.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper .....	7,023 lbs.	\$688
Gold .....		3,080
Silver .....	31 fine ozs.	20
Miscellaneous stone .....		285,223
Unapportioned* .....		246,711
Total value .....		\$535,722

\* Includes brick and hollow building tile, bromine, clay (pottery), feldspar, gems (kunsite and tourmaline), granite, magnesium salts, mineral water, salt.

## SAN FRANCISCO

*Land area:* 46½ square miles.

*Population:* 637,212 (1930 census).

*County seat:* San Francisco.

*Reference:* State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929).

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, and mineral water.

In fifty-second place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold .....		\$2,590
Silver .....	5 fine ozs.	3
Unapportioned* .....		31,014
Total value .....		\$33,607

\* Includes mineral water and miscellaneous stone.



## SAN JOAQUIN

*Land area:* 1448 square miles.

*Population:* 102,871 (1930 census).

*Location:* Central portion of State.

*County seat:* Stockton.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

San Joaquin County reported a mineral production for 1938 having a total value of \$781,907, as compared with \$706,620 for 1937. In thirty-second place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$41,580
Natural gas.....	5,720,352 M.cu.ft.	503,667
Miscellaneous stone.....		175,530
Silver.....	92 fine oss.	89
Other minerals.....		61,071
Total value.....		\$781,907

## SAN LUIS OBISPO

*Land area:* 3334 square miles.

*Population:* 29,617 (1930).

*Location:* Bordered by Kern County on the east and the Pacific Ocean on the west.

*County seat:* San Luis Obispo.

*References:* State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935).

The total value of the mineral production of San Luis Obispo County in 1938, with thirteen different mineral substances, was \$242,500, as compared with \$323,691 in 1937.

In forty-second place, commercial production for 1938 was as follows:

Substance	Amount	Value
Miscellaneous stone.....		\$19,150
Quicksilver.....	1,114 flasks	77,938
Unapportioned*.....		145,412
Total value.....		\$242,500

\* Includes brick and hollow building tile, clay (pottery and oil well drilling mud), limestone, marble (lime rock building stone), mineral water, petroleum, volcanic ash, sandstone, gold, silver.

**SAN MATEO**

*Land area:* 447 square miles.

*Population:* 77,338 (1930 census).

*Location:* Peninsula, adjoined by San Francisco on the north.

*County seat:* Redwood City.

*References:* State Mineralogist Report XVII : XVIII : XXV :  
 \ (April, 1929) : XXIX.

San Mateo County had a mineral output in 1938 of seven different substances, having a total value of \$2,026,217, as compared with the 1937 production worth \$2,310,784.

In twentieth place, commercial production for 1938 was as follows: cement, limestone (shells), magnesium salts, petroleum, salt, miscellaneous stone.

**SANTA BARBARA**

*Land area:* 2740 square miles.

*Population:* 65,075 (1930 census).

*Location:* Southwestern portion of State, adjoining San Luis Obispo on the south.

*County seat:* Santa Barbara.

*References:* State Mineralogist Report XV : XVII : XVIII :  
 XIX : XXI (Oct., 1925) : XXXII.

Santa Barbara County owes its position of ninth place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1938 was \$10,683,722, as compared with the 1937 output of \$10,709,056.

With thirteen different substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Natural gas.....	4,655,732 M. cu.ft.	\$327,466
Petroleum.....	9,555,145 bbls.	9,309,262
Quicksilver.....	104 flasks	7,179
Unapportioned*		1,039,815
Total value.....		\$10,683,722

\* Includes bituminous rock, brick and hollow building tile, clay (pottery), diatomite, granite (volcanic rock), marble (lime rock building stone), mineral water, miscellaneous stone.

**SANTA CLARA**

*Land area:* 1328 square miles.

*Population:* 144,921 (1930 census).

*Location:* West-central portion of State.

*County seat:* San Jose.

*References:* State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX.

Santa Clara County reported a mineral output for 1938 of \$624,-463, as compared with the 1937 figure of \$722,903.

In thirty-fourth place with eleven mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Brick.....	23,270 M.	\$236,285
Limestone (shells).....	98,944 tons	128,793
Quicksilver.....	283 flasks	19,883
Miscellaneous stone.....		213,636
Gold.....		35
Silver.....	1 fine oz.	1
Unapportioned*.....		25,820
<b>Total value.....</b>		<b>\$624,463</b>

\* Includes clay (pottery), gems (jasper), magnesite, petroleum.

**SANTA CRUZ**

*Land area:* 435 square miles.

*Population:* 37,405 (1930 census).

*Location:* Bordering Pacific Ocean, just south of San Mateo County.

*County seat:* Santa Cruz.

*References:* State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of San Cruz County, a portion of which is itemized below, amounted to a total of \$1,907,188 for 1938, giving the county a standing of twenty-second among all others in the State in this regard. The 1937 figure was \$2,074,463.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Miscellaneous stone.....		\$91,422
Gold.....		350
Silver.....	2 fine ozs.	1
Unapportioned*.....		1,815,415
<b>Total value.....</b>		<b>\$1,907,188</b>

\* Includes bituminous rock, cement, iron ore, lime, limestone.

**SHASTA**

*Land area:* 3858 square miles.

*Population:* 13,925 (1930 census).

*Location:* North-central portion of State.

*County seat:* Redding.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV.

Shasta County stood twenty-third in California among the mineral-producing counties in 1938, with an output valued at \$1,791,-727, as compared with the 1937 production worth \$2,199,423.

With ten mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$1,439,820
Silver.....	28,771 fine ozs.	18,599
Miscellaneous stone.....		80,520
Unapportioned*.....		252,988
Total value.....		\$1,791,727

\* Includes granite (volcanic rock), platinum, pyrite, sandstone, lead, copper.

**SIERRA**

*Land area:* 923 square miles.

*Population:* 2419 (1930 census).

*Location:* Eastern border of State just north of Nevada County.

*County seat:* Downieville.

*References:* State Mineralogist Report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI.

Sierra County reported a mineral production of \$905,237 in 1938 which was mainly gold, as compared with the 1937 output worth \$974,680.

In twenty-ninth place, commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$900,480
Lead.....	17,608 lbs.	810
Silver.....	4,809 fine ozs.	3,109
Unapportioned*.....		838
Total value.....		\$905,237

\* Includes miscellaneous stone, copper.

**SISKIYOU**

*Land area:* 6256 square miles.

*Population:* 25,505 (1930 census).

*Location:* Extreme north-central portion of State, next to Oregon boundary.

*County seat:* Yreka.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935) : XXXIV.

Siskiyou, fifth county in California in regard to size, located in highly mineralized and mountainous country, ranks twenty-sixth in regard to mineral output with ten mineral substances for 1938. The 1937 production was valued at \$1,200,351.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold .....		\$1,294,230
Silver .....	5,159 fine oss.	3,335
Miscellaneous stone .....		116,331
Unapportioned* .....		96,919
<b>Total value</b> .....		<b>\$1,510,815</b>

\* Includes copper, lead, mineral water, platinum, pumice, tube mill pebbles.

**SOLANO**

*Land area:* 822 square miles.

*Population:* 40,807 (1930 census).

*Location:* Touching San Francisco Bay on the northeast.

*County seat:* Fairfield.

Solano, while mostly valley land, produced mineral substances during the year 1938 to the total value of \$431,677, ranking it thirty-eighth among the counties of the State, compared with the 1937 output worth \$145,567.

Commercial production for 1938 included natural gas, quicksilver, and miscellaneous stone.

**SONOMA**

*Land area:* 1577 square miles.

*Population:* 62,248 (1930 census).

*Location:* South of Mendocino County, bordering on the Pacific Ocean.

*County seat:* Santa Rosa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926).

Sonoma County ranked forty-third among the counties of California during 1938 with a mineral output valued at \$232,495, as compared with the 1937 figure of \$273,063.

Commercial production during 1938 was as follows:

Substance	Amount	Value
Mineral water.....	23,604 gals.	\$4,365
Quicksilver.....	425 flasks	29,641
Unapportioned*		198,489
Total value.....		\$232,495

\*Includes clay (pottery), granite (tuffa), miscellaneous stone.

### STANISLAUS

*Land area:* 1450 square miles.

*Population:* 56,624 (1930 census).

*Location:* Center of State, bounded on south by Merced County.

*County seat:* Modesto.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923 and 1925-1930 by miscellaneous stone. This county for 1938 ranked thirty-first in the State in regard to minerals, with an output valued at \$845,523, as compared with \$940,030 in 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$453,250
Silver.....	1,332 fine ozs.	861
Miscellaneous stone.....		290,036
Unapportioned*		101,376
Total value.....		\$845,523

\*Includes clay (pottery), magnesite, platinum.

### SUTTER

*Land area:* 608 square miles.

*Population:* 14,618 (1930 census).

*Location:* Bounded by Butte County on the north and Sacramento on the south.

*County seat:* Yuba City.

*References:* State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral substance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928, and 1937-1938.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis. During 1938 there was a commercial output of pottery clay, natural gas, and miscellaneous stone, having a total value of \$28,973.

**TEHAMA**

*Land area:* 2893 miles.

*Population:* 13,839 (1930 census).

*Location:* North-central portion of the State, bounded on the north by Shasta.

*County seat:* Red Bluff.

*References:* State Mineralogist Report XV : XVII : XVIII : XIV : XXIV (July, 1928).

Tehama County stood forty-seventh among the mineral-producing counties of the State for 1938, with an output valued at \$81,431, as compared with the 1937 yield worth \$65,193.

Commercial production in 1938 included gold, platinum, silver, and miscellaneous stone.

**TRINITY**

*Land area:* 3166 square miles.

*Population:* 2811 (1930 census).

*Location:* Northwestern portion of State.

*County seat:* Weaverville.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX : XXXIV.

Trinity County's 1938 output of minerals was valued at \$1,493,132, as compared with the 1937 figure of \$721,290, mainly due to gold which gives the county a rank of twenty-seventh for the year.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$1,451,345
Silver.....	4,628 fine ozs.	2,992
Miscellaneous stone.....		36,456
Unapportioned*.....		2,339
Total value.....		\$1,493,132

\* Includes coal and platinum.

**TULARE**

*Land area:* 4856 square miles.

*Population:* 77,375 (1930 census).

*Location:* Bounded by Inyo on the east, Kern on the south, Fresno on the north.

*County seat:* Visalia.

*References:* State Mineralogist Report XV : XVII : XVIII : XX.

Tulare County stands forty-first on the list of mineral producing counties for 1938, with eight different mineral substances, having a total value of \$273,199, as compared with the 1937 figure of \$314,952.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$1,400
Silver.....	19 fine oss.	12
Miscellaneous stone.....		151,788
Unapportioned*.....		119,999
Total value.....		\$273,199

\* Includes brick and hollow building tile, natural gas, petroleum, tungsten ore.

### TUOLUMNE

*Land area:* 2190 square miles.

*Population:* 9239 (1930 census).

*Location:* East-central portion of State—Mother Lode District.

*County seat:* Sonora.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928) : XXXIV.

Tuolumne County ranks twenty-eighth among the counties of the State relative to its total value of mineral output for 1938 with ten different substances. This county ranks first as a producer of marble in the State. The mineral production for 1938 was valued at \$1,130,263, as compared with \$1,012,180 for 1937.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Copper.....	2,899 lbs.	\$284
Gold.....		854,490
Silver.....	7,029 fine oss.	4,544
Miscellaneous stone.....		84,568
Unapportioned*.....		186,377
Total value.....		\$1,130,263

\* Includes lead, granite, lime, limestone, slate

### VENTURA

*Land area:* 1878 square miles.

*Population:* 54,577 (1930 census).

*Location:* Southwestern portion of State, bordering on Pacific Ocean.

*County seat:* Ventura.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXI : XXVIII (July-Oct., 1932).

Ventura is fourth in the State in respect to the value of its mineral output for 1938. The 1938 mineral production was worth \$21,966,416, as compared with the 1937 output valued at \$19,230,720.



With nine different mineral substances, commercial production for 1938 was as follows:

Substance	Amount	Value
Natural gas.....	43,239,220 M. cu. ft.	\$2,990,127
Petroleum.....	16,979,962 bbls.	18,707,689
Miscellaneous stone.....		256,199
Gold.....		665
Silver.....	5 fine oss.	3
Unapportioned*		11,733
Total value.....		\$21,966,416

\* Includes clay (rotary drilling mud) and granite.

### YOLO

*Land area:* 1017 square miles.

*Population:* 23,618 (1930 census).

*Location:* Sacramento Valley, bounded by Sutter on the east and Colusa on the north.

*County seat:* Woodland.

*References:* State Mineralogist Report XIV : XVII : XVIII.

Yolo County, in fiftieth place, had a commercial production for 1938 as follows, compared with \$44,171 the preceding year:

Substance	Value
Miscellaneous stone.....	\$44,598
Unapportioned*.....	3,634
Total value.....	\$48,232

\* Includes natural gas and quicksilver.

### YUBA

*Land area:* 639 square miles.

*Population:* 11,327 (1930 census).

*Location:* Lies west of Sierra and Nevada counties; south of Plumas.

*County seat:* Marysville.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked fifteenth among the counties of the State as a mineral producer and fourth in respect to gold, which is obtained mainly by dredges. The 1937 output was valued at \$2,587,748.

Commercial production for 1938 was as follows:

Substance	Amount	Value
Gold.....		\$2,461,935
Silver.....	8,349 fine oss.	5,397
Miscellaneous stone.....		163,628
Other minerals.....		2,178
Total value.....		\$2,633,138



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## CHAPTER VIII

### DIRECTORY OF PRODUCERS OF METALLIC AND NON-METALLIC MINERALS IN CALIFORNIA 1938

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**NOTE.**—The producers of natural gas and petroleum will be found in the Quarterly Summary of Operations, California Oil Fields, for July, August and September, 1938 (Vol. 24, No. 2).

ALUM (Natural)

Operator	Address	Location of mine
<i>Riverside County</i> Nicholas Baxter.....	1316 Perris St., San Bernardino.....	Corona

BARYTES

Operator	Address	Location of mine
<i>Mariposa County</i> National Lead Co., National Pigments & Chemical Division.....	722 Chestnut St., St. Louis, Mo.....	El Portal
<i>Nevada County</i> Industrial Minerals & Chemical Co.....	836 Gilman St., Berkeley.....	Nevada City

BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
<i>Los Angeles County</i> Pomona Tile Mfg. Co.....	Pomona.....	Pomona
<i>San Benito County</i> D. L. Stewart Property, A. P. Stewart, Lessee.....	1052 Vermont St., San Jose.....	Tres Pinos
<i>San Bernardino County</i> Walter Becker..... William M. Hewson..... National Lead Co., National Pigments & Chemical Div..... J. H. Stone..... Velvet-White Mines, B. Driscoll.....	Box 43, Red Mountain..... Box 336, Oro Grande..... 983 Wilson, Los Angeles..... Barstow..... 4721 Second Ave., Los Angeles.....	Red Mountain Oro Grande Hector Barstow Oro Grande

## BITUMINOUS ROCK

Operator	Address	Location of mine
<i>Santa Barbara County</i> Higgins Quarry, D. A. Sattler, Lessee.....	856 Arguello Rd., Santa Barbara.....	Carpinteria
<i>Santa Cruz County</i> Calrock Asphalt Co.....	525 Market St., San Francisco.....	Majors

## BORATES

Operator	Address	Location of mine
<i>Inyo County</i> Pacific Alkali Co.....	1209 Pacific Mutual Bldg., Los Angeles.....	Bartlett
<i>Kern County</i> Pacific Coast Borax Co.....	510 W. 6th St., Los Angeles.....	Kramer
<i>San Bernardino County</i> American Potash and Chemical Corp..... West End Chemical Co.....	Trona..... Latham Square Bldg., Oakland.....	Trona Searies Lake

## BROMINE

Operator	Address	Location of mine
<i>Alameda County</i> Westvaco Chlorine Prod. Corp.....	Newark.....	Newark
<i>San Diego County</i> Westvaco Chlorine Prod. Corp.....	Newark.....	San Diego

## CALCIUM CHLORIDE

Operator	Address	Location of mine
<i>San Bernardino County</i> California Rock Salt Co..... Hollar Chemical, Inc.....	2465 Hunter St., Los Angeles..... 2000 Santa Fe Ave., Los Angeles.....	Amboy Fountain

## CARBON DIOXIDE GAS

Operator	Address	Location of wells
<i>Imperial County</i> National Dry Ice Co..... Pacific-Imperial Dri-Ice, Inc., Carl M. Einhart, Pres.....	Niland..... Niland.....	Niland Niland

## CEMENT

Operator	Address	Location of mill
<i>Calaveras County</i> Calaveras Cement Co.....	315 Montgomery St., San Francisco.....	San Andreas
<i>Contra Costa County</i> Henry Cowell Lime and Cement Co.....	2 Market St., San Francisco.....	Cowell
<i>Kern County</i> Monolith Portland Cement Co.....	Bartlett Bldg., Los Angeles.....	Monolith
<i>Los Angeles County</i> Blue Diamond Corp.....	1650 S. Alameda St., Los Angeles.....	Los Angeles
<i>Merced County</i> Yosemite Portland Cement Co.....	Merced.....	Merced
<i>Riverside County</i> Riverside Cement Co.....	621 S. Hope St., Los Angeles.....	Riverside
<i>San Bernardino County</i> California Portland Cement Co.....	601 W. Fifth St., Los Angeles.....	Colton
<i>Southwestern Portland Cement Co.</i>	503 Roosevelt Bldg., Los Angeles.....	Victorville
<i>San Mateo County</i> Pacific Portland Cement Co.....	111 Sutter St., San Francisco.....	Redwood City
<i>Santa Cruz County</i> Santa Cruz Portland Cement Co.....	Crocker Bldg., San Francisco.....	Davenport

## CHROMITE

Operator	Address	Location of mine
<i>El Dorado County</i> U. S. Chrome Mines, Inc., Alwyn H. Wild.....	2240 Hyde St., San Francisco.....	Folsom
<i>Fresno County</i> Bradley & Ekstrom.....	320 Market St., San Francisco.....	Tollhouse
<i>Placer County</i> Daniel Sullivan.....	Alta.....	Dutch Flat

10—77436

CLAY—1938  
(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
<b>Alameda County</b>			
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	116 Natomas St., San Francisco	Alameda
Interlocking Tile Co.	a, c	Niles	Niles
Kratville Co.	a, b	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Technical Porcelain and China Ware Co.	a	420 Kains Ave., Albany via Berkeley	Albany
Warrich Pottery	a	1285 Hearst Ave., Berkeley	Berkeley
Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Works	a	62d and Green Sts., Emeryville	Emeryville
Woodlenius Tiles & Mantels	a	1315 2d St., Berkeley	Berkeley
<b>Amador County</b>			
M. J. Bacon	c	Ione	Carbondale
Cal. Mineral Products Co., Ione Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Ione
N. Clark & Sons	c	116 Natomas St., San Francisco	Ione
Clay Corp. of California	c	1267 Russ Bldg., San Francisco	Ione
Ione Fire Brick Co., J. T. Roberts, Mgr.	b	1267 Russ Bldg., San Francisco	Ione
<b>Calaveras County</b>			
California Pottery Co.	c	Niles	Valley Springs
<b>Contra Costa County</b>			
California Art Tile Corp.	a	Box 1116, Richmond	Richmond
Port Costa Brick Works, C. G. Berg, Pres.	b, c	6th and Berry Sts., San Francisco	Port Costa
Standard Sanitary Mfg. Co., H. W. Creeger, Mgr.	a	Box W, Richmond	Richmond
Stockton Fire Brick Co.	b	Russ Bldg., San Francisco	Pittsburg
United Materials & Richmond Brick Co., Ltd.	b	Box 7, Richmond	Richmond
<b>Fresno County</b>			
Craycroft Brick Co.	a, b	Griffith-McKenzie Bldg., Fresno	Fresno
<b>Humboldt County</b>			
D. J. Thompson Brick Co.	a, b, c	Box 16, Myrtle Ave., Eureka	Eureka
<b>Kern County</b>			
American Minerals Co.	c	2808 S. Pacific, San Pedro	Cantil
Bakersfield Rock & Gravel Co.	d	Box 395, Sta. A, Bakersfield	Bakersfield
Bakersfield Sandstone Brick Co., James Curran, Mgr.	b	Bakersfield	Bakersfield
C. W. Hartman	d	Bakersfield	Bakersfield
King Lumber Co.	b	1402 King St., Bakersfield	Bakersfield
Mojave Corp.	d	Box 174, Los Nietos	Muroc



*Los Angeles County*

<i>Alhambra Kilns, Inc., L. C. Merwin</i>	<i>Alhambra</i>	<i>Alhambra and Santa Monica</i>
<i>American Refractories Co.</i>	3832 E. Pico Blvd., Los Angeles	<i>Los Angeles</i>
<i>Angulo Tile Co., L. R. H. and W. H. Angulo</i>	Reseda, Los Angeles County	<i>Reseda</i>
<i>J. A. Bauer Pottery Co.</i>	415 W. Ave. 33, Los Angeles	<i>Los Angeles</i>
<i>J. Booth</i>	1775 Stanford, Santa Monica	<i>Santa Monica</i>
<i>Builders Brick Co., Ltd.</i>	177th and Western Aves., Moneta	<i>Moneta and Compton</i>
<i>Ceramic Corp.</i>	4010 Whiteside St., Los Angeles	<i>Los Angeles</i>
<i>City Brick Co.</i>	1900 W. Manchester, Los Angeles	<i>Los Angeles</i>
<i>Claycroft Potteries, Fred H. Robertson</i>	3101 San Fernando Blvd., Los Angeles	<i>Ingleswood</i>
<i>H. F. Coors Co., Inc.</i>	4701 Floral Dr., Los Angeles	<i>Los Angeles</i>
<i>Davidson Brick Co.</i>	4100 Alameda, Los Angeles	<i>Arcadia</i>
<i>Eljer California Co.</i>	5601 S. Boyle Ave., Vernon	<i>Vernon</i>
<i>Emisco Refractories Co.</i>	2901 Los Feliz Blvd., Los Angeles	<i>Tropico, Los Angeles, Santa Monica, Hermosa Beach and Vernon</i>
<i>Gladding, McBean &amp; Co., Tropico, L. A. &amp; S. M. Plants</i>		
<i>Higgins Brick &amp; Tile Works</i>	Box 525, Moneta	<i>Moneta</i>
<i>Italian Terra Cotta Co.</i>	1149 Mission Rd., Los Angeles	<i>Los Angeles</i>
<i>Long Beach Brick Co., Inc., H. A. Hayner, Mgr.</i>	422 E. Broadway, Long Beach	<i>Long Beach</i>
<i>Markoff Mosaic Tile Corp.</i>	1107 E. Redondo Blvd., Ingleswood	<i>Ingleswood</i>
<i>Pacific Clay Products</i>	Box 145, Sta. A, Los Angeles	<i>Los Angeles and Los Nietos</i>
<i>Pacific Tile &amp; Porcelain Co.</i>	3428 W. Pico Blvd., Los Angeles	<i>Los Angeles and Los Nietos</i>
<i>Pomona Brick Co., Wm. McMullen, Mgr.</i>	Pomona	<i>Pomona</i>
<i>Pomona Tile Mfg. Co.</i>	Pomona	<i>Pomona</i>
<i>San Vallee Tile Kilns, R. F. Stubver, Mgr.</i>	6601 Wilbur, Reseda	<i>Reseda</i>
<i>St. Louis Fire Brick and Clay, Joseph Mesmer</i>	3050 E. Slauson St., Los Angeles	<i>Los Angeles</i>
<i>Simons Brick Co., Walter R. Simons</i>	1195 S. Boyle Ave., Los Angeles	<i>Los Angeles</i>
<i>Tillotson Clay Products</i>	3363 Fruitland Rd., Vernon	<i>Vernon</i>
<i>Vernon Potteries</i>	2300 E. 52d St., Los Angeles	<i>Vernon</i>
<i>Vitretrax Co.</i>	5050 Pacific Blvd., Los Angeles	<i>Los Angeles</i>
<i>Marin County</i>		
<i>McNear Brick Co.</i>	McNear Point, San Rafael	<i>McNear</i>
<i>Mono County</i>		
<i>California Kaolin Co.</i>	811 W. 7th St., Los Angeles	<i>Casa Diablo</i>
<i>Orange County</i>		
<i>Arnold Clay Mine, I. P. Arnold</i>	1846 W. 83d St., Los Angeles	<i>El Toro</i>
<i>Gladding, McBean &amp; Co.</i>	2901 Los Feliz Blvd., Los Angeles	<i>Gypsum</i>
<i>La Bolsa Tile Co.</i>	R.F.D. 1, Box 174, Huntington Beach	<i>Saltzer</i>
<i>Mission Clay Products Co.</i>	Olive	<i>Olive</i>
<i>Pacific Clay Products</i>	Box 145, Sta. A, Los Angeles	<i>El Toro</i>
<i>Tierra Colorado Clay Co.</i>	Box 473, San Juan Capistrano	<i>San Juan Capistrano</i>

a. Clay products. b. Brick and hollow building-tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand.

CLAY—1938—Continued  
(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
<i>Placer County</i> Clay Corp. of Calif. Gladding, McBean & Co., Lincoln Clay Products Co., M. J. Dillman, Mgr.	c a, b, c c	1267 Russ Bldg., San Francisco. 2901 Los Feliz Blvd., Los Angeles Lincoln.	Lincoln Lincoln Lincoln
<i>Riverside County</i> Alberhill Coal and Clay Co. Los Angeles Brick Co. Pacific Clay Products Temescal Clay Co.	c a, b, c c c	2406 E. 58th St., Los Angeles 1078 Mission Rd., Los Angeles 650 Chamber of Commerce Bldg., Los Angeles 5601 S. Boyle Ave., Los Angeles	Alberhill Alberhill Corona Temescal
<i>Sacramento County</i> Cannon & Co. H. C. Muddox, Jessie E. Muddox, Owner. Panama Pottery Co.* Sacramento Brick Co.	a, b a a b	Box 802, Sacramento. 30th and L Sts., Sacramento. R.F.D. 4, Box 1478, 24th St. Rd., Sacramento. 1300 Front St., Sacramento.	Ben Ali Sacramento Sacramento Sacramento
<i>San Benito County</i> D. L. Stewart Property, A. P. Stewart, Lessee.	c	1052 Vermont, San Jose.	Tres Pinos
<i>San Bernardino County</i> Mr. Walter Becker Chamberlain Co. Inc. Hancock Brick Yard, C. P. Hancock & Son. Hart Clay Co. W. K. Skeoch, Lessor. William M. Hawson Kennedy Clay Pitt, John Kennedy National Lead Co. Pigments & Chemical Div. Standard Sanitary Mfg. Co., Pacific Mines, P. R. Jones, Mgr. J. H. Stockton Temescal Clay Co. Velvet-White Mines, B. Driscoll.	e e b c c e c e e c, e	Box 43, Red Mountain. 2550 E. 9th St., Los Angeles 4330 Lemon St., Riverside 2022 Thayer Ave., Los Angeles. Box 336, Oro Grande 1306½ Warren Ave., Los Angeles 983 Wilson, Los Angeles Campo. Barslow. 5601 S. Boyle Ave., Vernon. 4721 Second Ave., Los Angeles.	Red Mountain Olancho Highgrove Goffs Oro Grande Daggett Hector Hart Barslow Hicks Oro Grande
<i>San Diego County</i> Pacific Clay Products Co. Union Brick Co., J. W. Rice Virified Products Corp.	c b a, b, c	Box 145, Station A, Los Angeles 3565 3d St., North San Diego 2841 Jefferson St., North San Diego	Farr Station Rose Canyon North San Diego
<i>San Joaquin County</i> San Joaquin Brick Co., J. F. Stein, Secretary. Stockton Brick & Tile Co.	b c	33 S. El Dorado St., Stockton. McKinley Ave., Stockton.	Stockton Stockton

<i>San Luis Obispo County</i> Antelope Mud Co., W. G. Angus, Mgr. San Luis Brick Works, Faulstich Bros.	d b	Box 204, Lost Hills San Luis Obispo.	Cholame San Luis Obispo
<i>San Mateo County</i> Richmond Potteries, Inc.	a	Box 187, South San Francisco.	South San Francisco
<i>Santa Barbara County</i> McNall Building Materials Parker Brick Co., J. Y. Parker	a, b, c a, b	208 N. Salsipuedes, Santa Barbara. 303 Ladera St., Santa Barbara.	Santa Barbara Santa Barbara
<i>Santa Clara County</i> Coyote Creek Clay Beds, L. R. Lenfest. Garden City Pottery Gladding Bros. Mfg. Co. Hancock Tile Co., L. W. Austin et al. Myers Ceramic Pottery, A. Clay Myer Remillard Brick Co. San Jose Brick Co. S. & L. Tile Co.	c a a, b, c a a b b a	1195 E. Santa Clara St., San Jose. 560 N. 6th St., San Jose. S. 3d and Keyes Sts., San Jose. R.F.D. 2, Box 121A, San Jose. Box 97, Santa Clara. 569 3d St., Oakland. Box 274, San Jose. 1881 S. 1st St., San Jose.	San Jose San Jose San Jose San Jose Santa Clara San Jose San Jose San Jose
<i>Sonoma County</i> Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco.	Glen Ellen
<i>Stanislaus County</i> Coopertown Clay Deposit, J. H. Hornsby.	c	651 Cumberland St., Pittsburg.	Coopertown
<i>Sutter County</i> Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles.	Nicolaus
<i>Tulare County</i> San Joaquin Materials Co.	b	744 G St., Fresno.	Exeter
<i>Ventura County</i> Hercules Rotary Mud Co., Selby Shale Pit Shell Oil Co., Dent Clay Pit.	d d	2000 N. Ventura Ave., Ventura Shell Bldg., San Francisco.	Ventura Ventura

\* Plant destroyed by fire.  
a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Ganister.

## COAL

Operator	Remarks	Address	Location of mine
<i>Amador County</i> Buena Vista Coal Mine, Fred Harkness & Sons.....	Ione.....		Buena Vista
<i>San Benito County</i> M & R Coal Mine.....	R.F.D. 1, Box 81, Salinas.....		San Benito
<i>Trinity County</i> Tom Reese.....	Douglas City.....		Douglas City

## COPPER

*Principal Copper Producers in California during 1938*

Mine	Operator	Address	Location of mine
<i>Calaveras County</i> Penn.....	Penn Copper and Zinc Mining Co.....	Lodi.....	Campo Seco
<i>El Dorado County</i> Big Canyon.....	The Mountain Copper Co., Ltd.....	351 California St., San Francisco.....	Shingle
<i>Imperial County</i> American Girl.....	O'Brien Mines, Inc.....	Box 465, Ocean Beach.....	Ogilby
<i>Inyo County</i> Cardinal.....	Cardinal Gold Mining Co.....	Bin D, Bishop.....	Bishop
<i>Nevada County</i> Lava Cap Spanish.....	Lava Cap Gold Mining Corp..... Bradley Mining Co.....	Box 780, Nevada City..... 922 Crocker Bldg., San Francisco.....	Nevada City Washington
<i>Plumas County</i> Walker.....	Walker Mining Co.....	818 Kearns Bldg., Salt Lake City, Utah.....	Walkermines
<i>Riverside County</i> Black Eagle.....	Imperial Smelting & Ref. Co.....	Box 1096, Indio.....	Indio
<i>San Bernardino County</i> Roosevelt..... Kelly.....	Bagdad Chase..... Frank W. Royer.....	Daggett..... Red Mountain.....	Daggett Red Mountain

## DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
<i>Los Angeles County</i> The Dicalite Co..... Diatomaceous Earth Corp.....	756 S. Broadway, Los Angeles Walteria.....	San Pedro Walteria
<i>Monterey County</i> Pacatone, Ltd.....	Bradley.....	Bradley
<i>Santa Barbara County</i> Johns-Manville Products Corp..... Lompoc Mining Products, Inc. <sup>1</sup> .....	Lompoc..... Lompoc.....	Lompoc Lompoc

<sup>1</sup> Now out of business.

## DOLOMITE

Operator	Address	Location of quarry
<i>Inyo County</i> Inyo Marble Co.....	726-732 E. 29th St., Los Angeles.....	Keeler
<i>Los Angeles County</i> W. F. Glasser, Inc.....	713 N. Sepulveda, Brentwood Heights, Los Angeles.....	Bel-Air
<i>Monterey County</i> Pacific Coast Steel Corp., Sterling Ranch Quarry.....	20th and Illinois Sts., San Francisco.....	Natividad
<i>San Benito County</i> Archie E. Hamilton.....	Hollister.....	Hollister

FELDSPAR

Operator	Address	Location of mine
<i>Fresno County</i> Industrial Minerals & Chemical Co.....	836 Gilman St., Berkeley.....	Friant
<i>San Diego County</i> Standard Sanitary Mfg. Co., P. R. Jones, Mgr.....	Campo.....	Campo

GARNETS

Operator	Address	Location of quarry or mine
<i>Inyo County</i> Tungsten Milling Co., Raymond A. Stolle.....	Box 461, Bishop.....	Bishop

GEMS

Operator	Variety	Address
C. M. Carter..... W. C. Eyles..... Robert J. Graham..... H. F. Heather..... Pala Chief Mine, Margaret S. Moore and M. Wear.....	Topaz..... Orbicular and brecciated jasper..... Iridescent obsidian..... Iceland spar..... Tourmaline, kunzite.....	553 27th St., Oakland 2025 Foothill Blvd., Oakland Davis Creek 236 Oak Knoll Ave., Pasadena Box 33, Pala

GOLD

Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
<b>Amador County</b>				
Argonaut	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco.	Jackson
Arroyo Seco	e	Arroyo Seco Gold Dredging Co.	351 California St., San Francisco.	Yuba
Ballard	h	W. D. Ingram	Plymouth.	Plymouth
Belden Amador	a	Pelden Amador Mines, Inc.	Pine Grove.	Pine Grove
Black Metal	a	L. A. Dunlap	Jackson.	Jackson
Central Eureka & Old Eureka	a	Central Eureka Mining Co.	511 Sutter St., San Francisco.	Sutter Creek
Central Eureka Dump	c	Central Tailings Co.	584 Market St., San Francisco.	Camanche
Comanche Dredge	e	Comanche Gold Dredging Co.	311 California St., San Francisco.	Pine Grove
Defender	a	The Willobar Corporation	Pine Grove.	Yuba
Delta Tailings Dump	c	Delta Tailings Co.	584 Market St., San Francisco.	Yuba
Dry Creek	h	Rim Cam Gold Dredging Co.	Yuba.	Volcano
E. A. Kent Dredge	h	E. A. Kent Dredging Co.	Volcano.	Volcano
Fort Ann	a	J. C. Nimmo & Wm. Anderson.	Jackson.	Drytown
Fremont Gover	a	Fremont Gover Co.	Oroville.	Sloughhouse
Holsinger	h	O. D. Gibson Co.	910 First National Bank Bldg., Denver, Colorado	Carbondale
Humphreys Dredge	h	Humphreys Gold Corporation	Yuba.	Yuba
Horton	g	H. G. Kreth	Plymouth.	Plymouth
Indian Creek	h	R. & M. Mining Co.	Jackson.	Jackson
Italian	a	Black Hills Mining Co., Inc.	519 California St., San Francisco.	Marshall
Kennedy	a	Kennedy Mining & Milling Co.	Amador City	Amador City
Keystone Mines	a	Keystone Mine Syndicate	Camanche.	Camanche
Lancha Plans Dredge No. 3	e	Lancha Plans Gold Dredging Co.	Lincoln	Sloughhouse
Lincoln Gold Dredge	h	Lincoln Gold Dredging Co.	Lincoln	Yuba
Lorentz	h	E. L. Lilly	106 California Bldg., Stockton.	Jackson
Mineral Point	a	Amadeo Casazza	Jackson.	Plymouth
River Pine	a	River Pine Mining Co.	918 3d St., San Rafael.	Elk Grove
Wolin-Hall-Wackman	h	Wolin-Hall-Wackman	Box 747, Elk Grove.	
<b>Butte County</b>				
Butte Unit Yuba Cons. Dredge	e	Yuba Consolidated Gold Fields	351 California St., San Francisco.	Rio Bonito
Butte Gold Dredge	h	Butte Gold Dredging Co.	Sacramento.	Oroville
Cinco Mineros	h	Cinco Mineros Co.	P. O. Box 212, Oroville.	Oroville
Coleman Property	k	Charles Coleman	Chico.	Chico
Consuelo	h	Consuelo Mines	Oroville.	Oroville
Forbestown (Midase-Gold Bank)	a	Idaho Maryland Mines Corporation.	Russ Bldg., San Francisco.	Forbestown
Gold Hill	e	Gold Hill Dredging Co.	311 California St., San Francisco.	Oroville

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued  
Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
<i>Butte County—Continued</i>				
Granella Ranch.....	h	Penn Dredging Co.....	1620 Bird St., Oroville.....	Oroville
Hintz.....	k	Chas. H. Hintz & S. Smith.....	Chico.....	Chico
Humphreys Dredge.....	k	Humphreys Gold Corporation.....	910 First National Bank Bldg., Denver, Colorado.....	Chico
Oroville Dredge.....	e	Oroville Gold Dredging Co.....	2052 Bird St., Oroville.....	Oroville
Richler & Sons Dredge.....	k	Wm. Richter.....	R. F. D. 2, Box 318, Oroville.....	Oroville
Skillin Property.....	h	Butte Mining & Development Co.....	Chico.....	Chico
Surcasse.....	a	Hoefling Bros.....	400 N. 16th St., Sacramento.....	Yankee Hill
Thompson's Flat.....	h	Table Mountain Dredging Co.....	Redding.....	Thompson Flat
<i>Calaveras County</i>				
California Gold Dredge.....	e	California Gold Dredging Co.....	503 Balfour Bldg., San Francisco.....	Linden
Camanche Placers.....	e	Camanche Placers, Ltd.....	Camanche.....	Camanche
Carson Hill.....	a	Carson Hill Gold Mining Corporation.....	Melones.....	Melones
Cook Properties.....	k	Pacific Placers Engineering Co.....	1736 Standard Ave., Glendale.....	Camanche
Easy Bird.....	h	Le Roi Mines, Inc.....	Box 905, Jackson.....	San Andreas
General Dredge.....	a	General Dredging Corporation.....	505 Bank of America Bldg., Sacramento.....	San Andreas
Gruwell Dredge.....	h	C. E. Gruwell.....	Angels Camp.....	Angels Camp
K. D. Winship Estate.....	h	K. D. Winship Estate.....	350 Post St., San Francisco.....	Wallace
Lancha Plana Dredge No. 2.....	e	Lancha Plana Gold Dredging Co.....	Camanche.....	Camanche
Lilly (Crocker).....	h	E. L. Lilly.....	706 California Bldg., Stockton.....	Wallace
Lloyd.....	f	E. B. Crouch.....	San Andreas.....	San Andreas
Milton.....	h	Milton Gold Dredging Enterprise.....	Milton.....	Milton
Mother Lode Central.....	a	Mother Lode Central Mines, Inc.....	Angels Camp.....	Angels Camp
Mountain King.....	a	Jumbo Cons. Mining Co.....	506 Bay Cities Bldg., Santa Monica.....	Copperopolis
Oneto Ranch.....	k	E. B. Kelly & Chas. C. Roe.....	San Andreas.....	San Andreas
Robbins Claims.....	k	Pacific Placers Engineering Co.....	1736 Standard Ave., Glendale.....	Valley Springs
Royal.....	k	Frank S. Tower.....	Milton.....	Milton
San Andreas Dredge.....	a	San Andreas Dredging Co.....	San Andreas.....	San Andreas
Sheepbranch.....	h	St. Joseph Lead Co.....	Sheepbranch.....	Sheepbranch
Thompson Dredge.....	e	Chas. James Thompson.....	Linden.....	Linden
University Dredge.....	a	Universal Dredging Corporation.....	San Andreas.....	San Andreas
Vallecito Western.....	h	Vallecito Mining Co., Inc. (Don Steffa).....	Murphys.....	Angels Camp
Wallace Dredge.....	e	Wallace Dredging Co.....	311 California St., San Francisco.....	Camanche
Western Quartz.....	a	Western Quartz Mining Co.....	Sheepbranch.....	Sheepbranch
Winkle Property.....	k	Pacific Placers Engineering Co.....	1736 Standard Ave., Glendale.....	Valley Springs
<i>El Dorado County</i>				
Beebe-Alpine.....	a	Beebe Gold Mining Co.....	1022 Crocker Bldg., San Francisco.....	Georgetown
Big Canyon.....	a	The Mountain Copper Co., Ltd.....	351 California St., San Francisco.....	Shingle
Big Canyon Dredge.....	h	Big Canyon Dredge.....	Box 33, Shingle.....	Shingle
Black Oak.....	a	Russell J. Wilson.....	Garden Valley.....	Garden Valley



<b>Buck's Bar</b> .....	
<b>El Dorado Crystal</b> .....	
<b>Loveless</b> .....	
<b>Kelsey</b> .....	
<b>Middle End</b> .....	
<b>Rosecrans</b> .....	
<b>Sliger</b> .....	
<b>Spanish Oak</b> .....	
<b>Stuckslager</b> .....	
<b>Humboldt County</b>	
<b>Pearch</b> .....	
<b>Imperial County</b>	
<b>American Girl</b> .....	
<b>Cargo Muchacho Group</b> .....	
<b>Sovereign</b> .....	
<b>Tumco Tailings</b> .....	
<b>Inyo County</b>	
<b>American Eagle (Little Jean)</b> .....	
<b>Arondo</b> .....	
<b>Cardinal</b> .....	
<b>Copper Queen</b> .....	
<b>Golden Treasure</b> .....	
<b>Inyo</b> .....	
<b>Mining Star</b> .....	
<b>Ormedia (Mohawk)</b> .....	
<b>Ruth</b> .....	
<b>Kern County</b>	
<b>Aunt Rosa</b> .....	
<b>Big Blue</b> .....	
<b>Big Butte</b> .....	
<b>Black Hawk</b> .....	
<b>Cactus Queen</b> .....	
<b>Elephant-Starlight and Lodestar</b> .....	
<b>Eureka</b> .....	
<b>Fairview</b> .....	
<b>Four Jacks</b> .....	
<b>Golden Queen</b> .....	
<b>King Solomon</b> .....	
<b>Middle Butte</b> .....	
<b>Operator</b> .....	
<b>Standard</b> .....	
<b>Tropico</b> .....	
<b>Yellow Aster</b> .....	
<b>Yellow Dog</b> .....	

a. Lode gold mine, b. Gold-Silver mine, c. Tailings dumps, d. Pocket, e. Dredge (bucket line), f. Drift mine, g. Hydraulic mine, h. Dragline dredge, i. Copper-Gold mine, k. Power shovel, m. Lead mine.

<b>Horseshoe Dredging Co.</b> .....	
<b>El Dorado Crystal Mine</b> .....	
<b>G. L. Fiske &amp; Tom Kloczko</b> .....	
<b>Kelsey Mining Co., Inc.</b> .....	
<b>Cosumnes Mines, Inc.</b> .....	
<b>Lode Development Co.</b> .....	
<b>Middle Fork Gold Mining Co.</b> .....	
<b>Russell J. Wilson</b> .....	
<b>E. J. McKenney</b> .....	
<b>Roy McGain &amp; Garcia E. Snow</b> .....	
<b>O'Brien Mines, Inc.</b> .....	
<b>Holmes &amp; Nicholson</b> .....	
<b>Sovereign Development Co.</b> .....	
<b>E. L. Riggs</b> .....	
<b>F. N. Banta</b> .....	
<b>Argus Mining Co.</b> .....	
<b>Cardinal Gold Mining Co.</b> .....	
<b>Gold Butte Mines, Inc.</b> .....	
<b>Ashford Brothers</b> .....	
<b>Inyo Cons. Mines, Inc.</b> .....	
<b>Mining Star Keeler Lease</b> .....	
<b>L. E. Netherton</b> .....	
<b>Burton Bros., Inc.</b> .....	
<b>Frasch &amp; Rudnick</b> .....	
<b>Kern Mines, Inc.</b> .....	
<b>Butte Lode Mining Co.</b> .....	
<b>King Solomon Mines Lease</b> .....	
<b>Cactus Mines Co.</b> .....	
<b>Lodestar Mining Co.</b> .....	
<b>Morris Albertoli</b> .....	
<b>E. W. Little</b> .....	
<b>Four Jacks Mining Co.</b> .....	
<b>Golden Queen Mining Co.</b> .....	
<b>J. H. Christensen</b> .....	
<b>Holmes, Gagon &amp; Smith</b> .....	
<b>Operator Cons. Mines Co.</b> .....	
<b>A. J. Bruce</b> .....	
<b>Burton Bros., Inc.</b> .....	
<b>Anglo American Mining Corp., Ltd.</b> .....	
<b>Alphonse Degraeve</b> .....	
<b>Youngs</b> .....	
<b>Shingle</b> .....	
<b>Rescue</b> .....	
<b>519 California St., San Francisco</b> .....	
<b>Grizzly Flats</b> .....	
<b>Auburn</b> .....	
<b>Box M., Auburn</b> .....	
<b>Garden Valley</b> .....	
<b>2704 D St., Sacramento</b> .....	
<b>Lotus</b> .....	
<b>Orleans</b> .....	
<b>Box 465, Ocean Beach</b> .....	
<b>Box 828, Yuma, Arizona</b> .....	
<b>Ogilby</b> .....	
<b>Ogilby</b> .....	
<b>Ogilby</b> .....	
<b>Invokern</b> .....	
<b>650 S. Grand Ave., Rm. 501, Los Angeles</b> .....	
<b>Bin D. Bishop</b> .....	
<b>Box 1556, Bakersfield</b> .....	
<b>Shoshone</b> .....	
<b>Box 74, Death Valley</b> .....	
<b>Keeler</b> .....	
<b>Red Mountain</b> .....	
<b>Rosamond</b> .....	
<b>Box 51, Caliente</b> .....	
<b>605 Market St., San Francisco</b> .....	
<b>1231 Roosevelt Bldg., Los Angeles</b> .....	
<b>Randsburg</b> .....	
<b>Rosamond</b> .....	
<b>Box 235, Mojave</b> .....	
<b>Mojave</b> .....	
<b>Box 70, Star Route, Rosamond</b> .....	
<b>Box 184, Mojave</b> .....	
<b>Box 296, Mojave</b> .....	
<b>Randsburg</b> .....	
<b>Mojave</b> .....	
<b>Randsburg</b> .....	
<b>Mojave</b> .....	
<b>Randsburg</b> .....	
<b>Rosamond</b> .....	
<b>Randsburg or 206 Sansome St., San Francisco</b> .....	
<b>Rosamond</b> .....	
<b>Mojave</b> .....	
<b>Youngs</b> .....	
<b>Shingle</b> .....	
<b>Rescue</b> .....	
<b>519 California St., San Francisco</b> .....	
<b>Grizzly Flats</b> .....	
<b>Auburn</b> .....	
<b>Box M., Auburn</b> .....	
<b>Garden Valley</b> .....	
<b>2704 D St., Sacramento</b> .....	
<b>Lotus</b> .....	
<b>Orleans</b> .....	
<b>Box 465, Ocean Beach</b> .....	
<b>Box 828, Yuma, Arizona</b> .....	
<b>Ogilby</b> .....	
<b>Ogilby</b> .....	
<b>Ogilby</b> .....	
<b>Invokern</b> .....	
<b>650 S. Grand Ave., Rm. 501, Los Angeles</b> .....	
<b>Bin D. Bishop</b> .....	
<b>Box 1556, Bakersfield</b> .....	
<b>Shoshone</b> .....	
<b>Box 74, Death Valley</b> .....	
<b>Keeler</b> .....	
<b>Red Mountain</b> .....	
<b>Rosamond</b> .....	
<b>Box 51, Caliente</b> .....	
<b>605 Market St., San Francisco</b> .....	
<b>1231 Roosevelt Bldg., Los Angeles</b> .....	
<b>Randsburg</b> .....	
<b>Rosamond</b> .....	
<b>Box 235, Mojave</b> .....	
<b>Mojave</b> .....	
<b>Box 70, Star Route, Rosamond</b> .....	
<b>Box 184, Mojave</b> .....	
<b>Box 296, Mojave</b> .....	
<b>Randsburg</b> .....	
<b>Mojave</b> .....	
<b>Randsburg</b> .....	
<b>Mojave</b> .....	
<b>Randsburg</b> .....	
<b>Rosamond</b> .....	
<b>Randsburg or 206 Sansome St., San Francisco</b> .....	
<b>Rosamond</b> .....	
<b>Mojave</b> .....	

j. Copper-Gold mine, k. Power shovel, m. Lead mine.

**GOLD—Continued**  
*Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938*

Mine	Type of mine	Operator	Address	Postoffice of mine
<i>Los Angeles County</i>				
Governor-----	a	Governor Mine Co.	725 S. Figueroa St., Los Angeles.	Acton
Valvue-----	a	Blake & Daly	Fairmont.	Fairmont
<i>Mariposa County</i>				
Bandarita-----	a	Bandarita Mining Co.	Coulterville.	Coulterville
Bondurant-----	a	Bondurant Mining & Milling Co.	Coulterville.	Coulterville
Champion-----	a	Carda Mining Co.	Box 54, Coulterville.	Coulterville
Cotton Creek-----	a	Cotton Creek Mining Co.	707 MacDonald Ave., Richmond.	Hornitos
Diltz-----	a	E. R. Baker, et al.	1518 14th St., Sacramento.	Whitlock
Melvina-----	a	Boston California Mining Co.	Sonora.	Coulterville
Marble Springs-----	a	E. S. McCurdy & P. D. Burtt.	220 Montgomery St., San Francisco.	Coulterville
Miners' Hope-----	a	Whitlock Mines Corporation.	Mariposa.	Mariposa
Miocene No. 2 & Gold Bug-----	a	N. D. Madden & K. L. Goulter.	Coulterville.	Coulterville
Mt. Gaines-----	a	Mt. Gaines Mining Co.	Hornitos.	Hornitos
Nutting Dredge-----	h	Nutting Dredging Co.	Box 728, Salinas.	Le Grand
Pine Tree and Josephine-----	a	Pacific Mining Co.	1022 Crocker Bldg., San Francisco.	Bear Valley
Placer Properties-----	h	Placer Properties Co., Inc.	Le Grand.	Le Grand
Schroeder Group-----	h	Charles M. Schroeder.	Midpines.	Midpines
Trebor Dredge-----	a	Trebor Corporation.	Mariposa.	Mariposa
<i>Merced County</i>				
Merced Dredge No. 1-----	e	Merced Dredging Co.	1805 Mills Tower, San Francisco.	La Grange
Merced Unit-----	e	Yuba Consolidated Gold Fields.	351 California St., San Francisco.	Snelling
San Joaquin Dredge No. 1-----	e	San Joaquin Mining Co.	1805 Mills Tower, San Francisco.	La Grange
Snelling Dredge No. 1 and No. 2-----	e	Snelling Gold Dredging Co.	Snelling.	Snelling
<i>Mono County</i>				
Log Cabin-----	a	Mutual Gold Corporation.	401 Fernwell Bldg., Spokane, Wash.	Leevining
Standard-----	a	Roseclip Mines Co.	206 Sansome St., San Francisco.	Bodie
<i>Napa County</i>				
Griseby (Palisades)-----	b	Graham Loftus Oil Corporation.	811 W. 7th St., Los Angeles.	Calistoga
<i>Nevada County</i>				
Bullion-----	a	Grass Valley Bullion Mines, Inc.	Grass Valley.	Grass Valley
Davey (Atlas Dredge)-----	h	Atlas Gold Dredging Corp.	712 Edison Bldg., Los Angeles.	Grass Valley
Douglas Property-----	h	Gold Star Dredging Co.	Box 265, Marysville.	Rough and Ready
Empire Star Group-----	a	Empire Star Mines Co., Ltd.	14 Wall St., New York City, N. Y.	Grass Valley
Giant King-----	a	Washington Giant King Gold Mines, Inc.	Nevada City.	Nevada City

<b>Golden Center</b> .....	Cooley Butler.....	745 Rowan Bldg., Los Angeles.....	Grass Valley
<b>Great Northern</b> .....	Great Northern Gold Mines, Inc.....	310 Broad St., Nevada City.....	Nevada City
<b>Idaho Maryland</b> .....	Idaho Maryland Mines Corp.....	Russ Bldg., San Francisco.....	Grass Valley
<b>Inns Dredge</b> .....	Inns Dredging Co.....	Nevada City.....	Nevada City
<b>Java Cap</b> .....	Lava Cap Gold Mining Corp.....	Box 780, Nevada City.....	Grass Valley
<b>Norambagus</b> .....	Campbell Gold Mining & Mining Co.....	Grass Valley.....	Grass Valley
<b>Omaga</b> .....	South Yuba Mining & Development Co.....	7 Front St., San Francisco.....	Washington
<b>Spanish</b> .....	Bradley Mining Co.....	922 Crocker Bldg., San Francisco.....	Washington
<b>Trude</b> .....	Shovel Placer Mining Co.....	Nevada City.....	North Columbia
<b>Placer County</b>			
<b>Alabama</b> .....	Alabama California Gold Mines Co.....	Box 155, Auburn.....	Penryn
<b>Antelope Creek</b> .....	Antelope Creek Dredging Co.....	311 California St., San Francisco.....	Loomis
<b>Auburn Chicago</b> .....	Auburn Chicago Mining Co.....	645 S. Mariposa Ave., Los Angeles.....	Penryn
<b>Auburn Ravine</b> .....	Pantile Bros.....	Lincoln.....	Lincoln
<b>Barton Ranch and Chabot</b>			
<b>property</b> .....			
<b>Bohnett Dredge</b> .....	Gold Hill Dredging Co.....	311 California St., San Francisco.....	Loomis
<b>E. L. Hill Dredge</b> .....	F. O. Bohnett.....	150 S. Montgomery St., San Jose.....	Lincoln
<b>Fay Placer</b> .....	Fay Placer Mine.....	North San Juan.....	Roseville
<b>Gaylord Lee Valle</b> .....	A. Swinburn.....	Lincoln.....	Lincoln
<b>General Utility</b> .....	General Utility Corp.....	Box 106, Sta. A, Auburn.....	Auburn
<b>Isom Ranch</b> .....	Nevada City Dredging Co.....	505 Bank of America Bldg., Sacramento.....	Roseville
<b>Kiss &amp; Clark properties</b> .....	Panob Gold Dredging Co.....	Nevada City.....	Loomis
<b>Lincoln Dredge</b> .....	Charles N. Cliftenden.....	Lincoln.....	Lincoln
<b>Newcomb</b> .....	Oro Bell Dredging Co.....	Lincoln.....	Loomis
<b>Oro Bell Dredge</b> .....	Oro Fino Cons. Mines.....	2406 Virginia St., Berkeley.....	Loomis
<b>Oro Fino</b> .....	Canyon Mines Corp.....	Box 432, Auburn.....	Auburn
<b>Rawhide Group</b> .....	Jasper-Stacy Co.....	144 Kearny St., San Francisco.....	Paxter
<b>Recalp</b> .....	Burn Ball Mining Co.....	216 Pine St., San Francisco.....	Lincoln
<b>Sisley</b> .....	T. D. Lindblad.....	Box 306, Auburn.....	Auburn
<b>Thompson</b> .....	A. C. Crosby.....	1923 12th Ave., Sacramento.....	Roseville
		Lincoln.....	Lincoln
<b>Plumas County</b>			
<b>Droege &amp; New York</b> .....	North Canyon Mines, Inc.....	Greenville.....	Greenville
<b>Glacier</b> .....	William F. Booth, Jr.....	1110 Crocker Bldg., San Francisco.....	Seneca
<b>Grays Flat</b> .....	Lord & Bishop.....	Box 812, Sacramento.....	Rich Bar
<b>Imperial</b> .....	Gerald R. Simpson.....	Box 957, Quincy.....	Quincy
<b>Meadow Valley</b> .....	F. O. Bohnett.....	54 N. Union Ave., Campbell.....	Meadow Valley
<b>Ohio Point (Virginia)</b> .....	Virginia Mining Corp.....	Virginia.....	Virginia
<b>Standart</b> .....	Indian Valley Mining Co., Inc.....	Greenville.....	Greenville
<b>Walker</b> .....	Walker Mining Co.....	818 Kearns Bldg., Salt Lake City, Utah.....	Walkerminne
<b>Riverside County</b>			
<b>Black Eagle</b> .....	Imperial Smelting & Refining Co.....	811 W. 7th St., Los Angeles.....	Indio
<b>Ida Leona</b> .....	Ida Leona Mng. & Mng. Co.....	Perris.....	Perris
<b>Red Cloud</b> .....	Frank Ahlburg.....	1608 N. Vermont Ave., Los Angeles.....	Chuckawalla

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued  
Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938

Mine	Type of mine	Operator	Address	Postoffice of mine
<i>Sacramento County</i>				
Capital Dredge	e	Capital Dredging Co.	351 California St., San Francisco	Folsom
Cosumnes Dredge	e	Cosumnes Gold Dredging Co.	351 California St., San Francisco	Sloughhouse
General Dredge	h	General Dredging Corp.	505 Bank of America Bldg., Sacramento	Folsom
Gold Hill Dredge	e	Gold Hill Dredging Co.	311 California St., San Francisco	Folsom
Hoosier Gulch	h	Hoosier Gulch Placers	1317 23d St., Sacramento	Folsom
Lord & Bishop Dredge	h	Lord & Bishop	Box 812, Sacramento	Sacramento
Natomas	e	Natomas Co.	Box 1197, Sacramento	Natomas
<i>San Bernardino County</i>				
Carlisle	a	Carlisle Mining Co.	463 S. Clark Dr., Beverly Hills	Twentynine Palms
Gold Crown	a	Gold Crown Mining Co., Ltd.	714 W. Olympic Blvd., Los Angeles	Twentynine Palms
Kelly	b	Frank W. Royer	Red Mountain	Red Mountain
Lucky	a	E. C. Johnson	Baker	Baker
Roosevelt	a	Bagdad Chase	Daggett	Daggett
Vulcan	a	Funk Bros.	Amboy	Amboy
<i>San Joaquin County</i>				
K. D. Winship Estate	h	K. D. Winship Estate	350 Post St., San Francisco	Camanche
Wallace Dredge	e	Wallace Dredging Co.	311 California St., San Francisco	Camanche
Watkins Dredge	h	A. G. Watkins & Sons	Linden	Linden
<i>San Luis Obispo County</i>				
Oro Fino	k	F. H. Gates, Inc.	Box 247, Santa Maria	Nacimiento
<i>Shasta County</i>				
Blue Gravel	a	Larsen Bros.	5220 21st St., Sacramento	Redding
Carlson & Sandburg Dredge	h	Carlson & Sandburg	Loren Hotel, Redding	Redding
Cinco Mineros	h	Cinco Mineros Co.	Box 212, Oroville	Redding
Dry Creek	h	Pioneer Dredging Co.	Box 700, Redding	Redding
El Oro Dredge	h	El Oro Dredging Co.	Box 771, Cottonwood	Cottonwood
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson
Olsen Dredge	h	Roy S. Olson	1178 Walnut Ave., Redding	Redding
Pilot Dredge	h	Pilot Dredging Co.	Box 579, Redding	Redding
Pombo Dredge	h	Pombo Dredging Co.	1571 Turk St., San Francisco	Redding
Red Hill	k	Harold Hellwig	150 S. Montgomery St., San Jose	Redding
Roaring River	e	Roaring River Gold Dredging Co.	351 California St., San Francisco	Cottonwood
Thibaut Ranch	e	Gold Acres Dredging Co.	Cottonwood or 658 Haddon Rd., Oakland	Cottonwood
Walker	a	Stewart-Brown Co.	206 Sansome St., San Francisco	Redding
Washington	a	J. H. Scott Co.	Merchants Exchange Bldg., San Francisco	French Gulch
	a	A. P. Robillard	French Gulch	French Gulch
	a	Roy Rohlin	Shasta	Shasta

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-Gold mine. k. Power shovel. m. Lead mine.

GOLD—Continued  
*Principal gold producers in California out of a total of 1,603 placer operators and lode mines in 1938*

Mine	Type of mine	Operator	Address	Postoffice of mine
<i>Trinity County—Continued</i>				
Sourdough	h	Golden Gravel Mining Co.	525 Merchants Exchange Bldg., San Francisco	Junction City
Trinity Dredge	c	Trinity Dredging Co.	Lewiston	Lewiston
Viking Dredge	h	Viking Dredging Co.	Box 568, Redding	Redding
Weaver Dredge	h	Weaver Dredging Co.	Box 216, Weaverville	Weaverville
West Weaver Creek	h	Pacific Gold Dredging Co.	2929 X St., Sacramento	Weaverville
<i>Tuolumne County</i>				
Boston-California	a	Boston California Mining Co.	Sonora	Sonora
Columbus	a	Columbus Gold Mining Co.	Montgomery St., San Francisco	Tuolumne
Densmore	a	Densmore Gold Mines, Inc.	Box 126, Columbia	Columbia
Eagle Shawmut	a	Miller & Clemson	4800 Santa Fe Ave., Los Angeles	Chinese Camp
Enterprise	a	Enterprise Cooperative Syndicate	Box 264, Sonora	Sonora
Heslep	a	Gold Diggers Syndicate	James town	James town
Kent Dredge	h	F. A. Kent Mines	144 California St., San Francisco	Sonora
Moccasin	h	Moccasin Mines	5220 21st Ave., Sacramento	Columbia
Rim Cam	h	Rim Cam Gold Dredging Co.	James town	James town
Sugarman	a	Ralph Butler, Sr.	5 Rose Ct., Sonora	Sonora
Sullivan	k	Jack Sullivan	Sonora	Sonora
<i>Yuba County</i>				
Blue Point	f	Asa Fippin	Smartville	Smartville
Camp Far West	k	Camp Far West Mining Co.	Wheatland	Wheatland
Horseshoe	a	Orrin P. Peterson	Challenge	Challenge
Mammoth	e	Williams Bar Gold Dredging Co.	918 Holart Bldg., San Francisco	Smartville
Pennsylvania	a	Empire Star Mines Co., Ltd.	14 Wall St., New York City	Brown's Valley
Yuba Unit	e	Yuba Cons. Gold Fields	351 California St., San Francisco	Hammonton

a. Lode gold mine. b. Gold-Silver mine. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Copper-Gold mine. k. Power shovel. m. Lead mine.

## GRANITE

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## GRANITE

Operator	Product	Address	Location of quarry
<i>Fresno County</i> Academy Granite.....	a	Clovis.....	Clovis Academy
Superior-Academy Granite Co.....	a	Clovis.....	
<i>Lassen County</i> A. D. Greig, Greig Quarry.....	a	Susanville.....	Susanville
<i>Los Angeles County</i> Binder Bros., W. H. Binder.....	d	285 N. Lake Ave., Pasadena.....	Bouquet Canyon
<i>Madera County</i> Madera Quarries Co.....	a	Box 156, Madera.....	Bates Station
<i>Mariposa County</i> Yosemite National Park.....	a	Yosemite.....	Yosemite Park
<i>Nevada County</i> Netz Granite Quarry, Ludwig Netz.....	a	Nevada City.....	Nevada City
<i>Placer County</i> Union Granite Co., Ruhkala Bros.....	a	Rocklin.....	Rocklin
Victor Wickman.....	a	Rocklin.....	Rocklin
<i>Plumas County</i> Paul Sonognini.....	a	Chilcoot.....	Chilcoot
<i>Riverside County</i> Emil Johnson.....	a, e	Perris.....	Perris
<i>Sacramento County</i> Folsom State Prison.....	a, e	Represa.....	Represa
<i>San Bernardino County</i> Texas Quarries, Inc., R. M. Richter.....	a	Box 91, Austin, Texas.....	Victorville
<i>San Diego County</i> Crystal Black Quarry, John Stridsburg.....	a	Escandido.....	Spooks Canyon
Pacific Cut Stone & Granite Co.....	a	414 S. Marengo Ave., Alhambra.....	Escandido
<i>Shasta County</i> Lassen Volcanic National Park.....	a	Mineral via Red Bluff.....	Lassen Volcanic National Park
<i>Sonoma County</i> S. Cabrol.....	b, c	Glen Ellen.....	Glen Ellen
Ernest Laurent.....	b, c	Kenwood.....	Kenwood
<i>Ventura County</i> Ritchie Bros., R. A. Ritchie and J. A. Ritchie.....	a	Fillmore.....	Grimes Canyon

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone and building stone. d. Mica schist used as building stone. e. Paving blocks.

11—77436



## GYPSUM

Operator	Address	Location of quarry
<i>Alameda County</i> Westvaco Chlorine Prod. Corp.*	Newark.....	Newark
<i>Fresno County</i> Dos Palos Gypsum Co., O. L. Divens and A. A. Conrowe. Green & Collins. Paoli Gypsum Mine, A. P. Shepard, Mgr.	Dos Palos..... Ceres..... 3101 Mariposa St., Fresno.....	Dos Palos South Dos Palos Mendota
<i>Imperial County</i> Imperial Gypsum Quarry, Pacific Portland Cement.	111 Sutter St., San Francisco.....	Plaster City
<i>Riverside County</i> U. S. Gypsum Co.....	507 Architects Bldg., Los Angeles.....	Midland

\*Output not included in production figures as gypsum is byproduct of chemical process using minerals already included in State total.

## IODINE

Operator	Address	Mine
<i>Los Angeles County</i> Deepwater Chemical Co., Ltd. I. O. Dow Chemical Co.....	Box 588, Compton..... 310 Santiago Ave., Long Beach.....	Compton Long Beach

## IRON

Operator	Address	Location of mine
<i>Inyo County</i> L. S. McGirk	Shoshone.....	Shoshone
<i>San Bernardino County</i> Cave Canyon Iron Mine, A. S. Vinnell Co.	11 Westminster Ave., Alhambra.....	Barter
<i>Santa Cruz County</i> Coast Metals & Reduction Co.....	Rob-Roy, c/o Watsonville.....	Aptos



LEAD  
Principal Lead Producers in California during 1938

Mine	Operator	Address	Location of mine
<i>Inyo County</i>			
Copper Queen	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Defiance	Darwin Lead Co.	Darwin	Darwin
Golden Treasure	Ashford Bros.	Shoshone	Shoshone
MacLean	Dr. John MacLean	5961 S. Main St., Los Angeles	Big Pine
Phil Day	H. P. Gower	Death Valley	Death Valley
Peg One Leg	H. L. Eckloff	Box 66, Keeler	Keeler
Santa Rosa	Santa Rosa Mines Dev. Co.	Keeler	Keeler
Ubehe	Grant Snyder	Continental Bldg., Los Angeles	Death Valley
	Theo. Peterson	Darwin	Darwin
<i>Nevada County</i>			
Empire Star Group	Empire Star Mines Co., Ltd.	14 Wall St., New York, N. Y.	Grass Valley
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	Bradley Mining Co.	922 Crocker Bldg., San Francisco	Washington
<i>Placer County</i>			
Alabama	Alabama California Gold Mines Co.	Box 1155, Auburn	Pearyn
<i>Riverside County</i>			
Black Eagle	Imperial Smelting & Ref. Co.	811 W. 7th St., Los Angeles	Indio
<i>San Bernardino County</i>			
Forty Nine	Alexander & Robinson	Goldsprings, Nevada	Goldsprings, Nevada

## LIME AND LIMESTONE

Operator	Product	Address	Location of quarry
<i>Alameda County</i> Westvaco Chlorine Prod. Corp.	a, d	Newark	Newark
<i>El Dorado County</i> Auburn Chemical Lime Co., Ltd. Diamond Springs Lime Co. El Dorado Limestone Co., J. H. Bell, Pres. Pac. Portland Cement Co., Cons.	a, b a, b, c a, b b	Auburn Diamond Springs Shingle Springs 111 Sutter St., San Francisco	Newcastle Diamond Springs Shingle Springs Auburn
<i>Fresno County</i> Mt. Campbell Lime Co., R. C. Finck, Mgr.	c, e	Dinuba	Reedley
<i>Inyo County</i> Blue Star Talc Mine, Ltd.	b	840 S. San Julian St. Los Angeles.	Zurich
<i>Los Angeles County</i> W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles.	
<i>Riverside County</i> Howard Small	b	311 Main St., Riverside	Riverside
<i>San Bernardino County</i> Cal. Portland Cement Co. Chubbuck Lime Co., Chas. I. Chubbuck Victorville Lime Rock Co.	a a, b, c b	601 W. 5th St., Los Angeles. 500 Worth St., Los Angeles. 2424 Enterprise St., Los Angeles.	Colton Chubbuck Victorville
<i>San Luis Obispo County</i> Charles Taylor	b	Salinas	Cambria
<i>San Mateo County</i> Pacific Portland Cement Co.	c, d	111 Sutter St., San Francisco	San Mateo
<i>Santa Clara County</i> Basic Limestone Products Co., R. J. Schirm Bay Shell Co. L. H. Beck California Lime Marl Fertilizer Co. W. B. Ordley Shell Co.	b c, d c, d c, e d	1 Division St., San Francisco. 503 Market St., San Francisco. Box 113, Colma R.F.D. 1, Box 684, San Jose. Alviso	Los Gatos Alviso Alviso Edenvale Alviso

<i>Santa Cruz County</i> Henry Covell Lime and Cement Co., W. H. George, Mgr. Pacific Limestone Prod. Co.	a, b b	2 Market St., San Francisco. Spring St., Santa Cruz.	Santa Cruz
<i>Tuolumne County</i> McLean Quarry, W. S. McLeans. U. S. Lime Products Corp.	a a, b	419 Bayshore Blvd., San Francisco. 58 Sutter St., San Francisco.	Columbia Sonora

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

## MAGNESITE

Operator	Address	Location of mine
<i>Santa Clara County</i> Westvaco Chlorine Prod. Corp., Lessee, Western Magnesite Mine.	Newark.	Red Mountain
<i>Stanislaus County</i> Westvaco Chlorine Prod. Corp., Lessee, Bald Eagle Mine.	Newark.	Gustine

## MAGNESIUM SALTS

Operator	Product	Address	Location of plant
<i>Alameda County</i> Westvaco Chlorine Prod. Corp.	Hydroxide	Newark.	Newark
<i>San Diego County</i> Westvaco Chlorine Prod. Corp.	Chloride	Newark.	San Diego
<i>San Mateo County</i> Marine Chemical Co., R. E. Clarke.	Carbonate hydroxide and oxide	South San Francisco.	South San Francisco
Plant Rubber & Asbestos Works.	Carbonate	537 Brannan St., San Francisco.	Redwood City

MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
<i>Los Angeles County</i> W. F. Glasser, Inc.	b	713 N. Sepulveda, Los Angeles	Brentwood Heights
<i>San Bernardino County</i> Onyx Mine, John Olsen & Pete Logan	c	Whitewater	
<i>San Luis Obispo County</i> Reynolds Quarry, Thomas C. Reynolds	b	Box 53, Paso Robles	Paso Robles
<i>Santa Barbara County</i> G. Antolini	b	111 E. Gutierrez St., Santa Barbara	Tiguas

a. Marble. b. Limestone, building and flagstone. c. Onyx and travertine.

MICA

Operator	Variety	Address	Location of property
<i>Imperial County</i> Mica Talc Co., Inc.	Mica schist	2908 S. Pacific Blvd., San Pedro	Ogilby

## MINERAL WATER

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## MINERAL WATER

Operator	Address	Location of spring
<i>Butte County</i> Richardson Mineral Springs, Lee Richardson, Mgr.	Richardson Springs	Richardson Springs
<i>Calaveras County</i> Mok-Hill Mineral Springs, Cavanaugh & Pierovich	Jackson	Mokelumne Hill
<i>Colusa County</i> Cooks Springs, D. D. Markham	Lodoga	Cooks Springs
<i>Contra Costa County</i> Alhambra Water Co.	Martinez	Martinez
<i>El Dorado County</i> Digger Indian Natural Medicine Water Co.	Randall P.O.	Randall
<i>Fresno County</i> Nerency Mineral Springs Co., F. J. Bourn, Pres.	Dos Palos	
<i>Lake County</i> Adams Mineral Springs, Clarence Prather The Matetic Bottling Co. Niman Mineral Springs, H. C. Noman, Mgr. Witter Medical Springs, W. E. Whitaker	Adams via Middletown 20 Beidman St., San Francisco Middletown 995 Market St., San Francisco	Adams Bartlett Springs Middletown Witter Springs
<i>Los Angeles County</i> Cascade Water Co. Deep Rock Artesian Water Elysian Spring Water Co. Frespuero Artesian Water Holly Spring Water Magnetic Spring Water Co. Mission Spring Water Co. Mountain Spring Water Co. Purcell Mineral Water Co. Sparklett Bottled Water Co.	4556 York Blvd., Los Angeles 4416 York Blvd., Los Angeles 1536 Baxter, Los Angeles 4430 York Blvd., Los Angeles 2298 Holly Dr., Los Angeles 936 Palm Ave., Sherman 8938 Keith, Hollywood 226 S. Avenue 54, Los Angeles 3640 Griffin, Los Angeles 4500 York Blvd., Los Angeles	Los Angeles Los Angeles Los Angeles Los Angeles Los Angeles Hollywood Los Angeles Los Angeles Los Angeles
<i>Marin County</i> Purity Spring Water Co.	2032 Kearny St., San Francisco	
<i>Modoc County</i> Surprise Valley Mineral Wells, Simon Bennett	Cedarville	Cedarville

## MINERAL WATER—Continued

Operator	Address	Location of spring
<i>Napa County</i>		
Calistoga Bottling Works, E. E. Hardies.....	Calistoga.....	Calistoga
Napa Soda Springs Co., G. H. T. Jackson.....	315 Montgomery St., San Francisco	Napa
Napa Viehy Springs, V. Frucoli.....	225 Bay St., San Francisco.	Napa
Samuels Soda Springs, Mrs. Robert J. Little.....	Monticello.....	Monticello
<i>Placer County</i>		
Kilaga Water Co.....	Lincoln.....	Valley
<i>Riverside County</i>		
Boula Springs, Oscar C. McNicholl.....	Arlington.....	Arlington
<i>San Bernardino County</i>		
Arrowhead Hot Springs, Calif. Cons. Water Co.....	1566 E. Washington Blvd., Los Angeles	Arrowhead
<i>San Diego County</i>		
Cuyamaca Mineral Water, San Diego Ice & Cold Storage Co.....	67 8th St., San Diego.....	San Diego
Rock Springs Co., E. S. Walek.....	R.F.D. 2, Box 442, Escondido	Escondido
<i>San Francisco County</i>		
Blue Crest Beverage Co., Morris & Paul Greenberg.....	265 Naples St., San Francisco.....	San Francisco
Diamond Rock Spring Water Co., L. Paolinelli.....	247 Naples St., San Francisco	San Francisco
<i>San Luis Obispo</i>		
Crystal Spring Water Co., W. R. Hudson.....	R.F.D. 2, Box 11, San Luis Obispo.....	San Luis Obispo
<i>Santa Barbara County</i>		
Veronica Mineral Springs Co.....	699 Brannan St., San Francisco	Santa Barbara
<i>Siskiyou County</i>		
Coca Cola Bottling Co., Fred J. Meamber, Prop.....	Yreka.....	Little Shasta
The Shasta Water Co.....	6th and Brannan Sts., San Francisco.	Dunsmuir
<i>Sonoma County</i>		
Acqua Caliente Springs Co., T. H. Corcoran, Prop.....	Acqua Caliente.....	Acqua Caliente
Baral Springs, John Kolling.....	Preston.....	Preston
Boyce Springs Mineral Water Co.....	Boyce Springs.....	Boyce Springs
Fetters Mineral Springs, George Fetters.....	Fetters Springs.....	Fetters Springs

**PLATINUM**  
*Principal Platinum Producers in California in 1938*

Operator	Address	Location of mine
<i>Butte County</i> Yuba Cons. Goldfields Co.*	351 California St., San Francisco.	Rio Bonito
<i>Merced County</i> Merced Dredging Co. Yuba Consolidated Gold Fields*	Mills Bldg., San Francisco. 351 California St., San Francisco.	Snelling Snelling
<i>Placer County</i> Gold Hill Dredging Co.	311 California St., San Francisco.	Loomis
<i>Sacramento County</i> Capital Dredging Co.* Natomas Co.*	Balfour Bldg., San Francisco. Forum Bldg., Sacramento.	Folsom Natomas
<i>Shasta County</i> Roaring River Gold Dredging Co.	351 California St., San Francisco.	Cottonwood
<i>Tehama County</i> The Midland Co.	733 Dwight Way, Berkeley.	Red Bluff
<i>Trinity County</i> Hayfork Dredging Co. Junction City Mining Co.	Hayfork. Junction City	Hayfork Junction City
<i>Yuba County</i> Yuba Consolidated Gold Fields*	351 California St., San Francisco.	Hammondon

\*Platinum metals not sold in 1938.

**POTASH**

Operator	Address	Location of plant
<i>San Bernardino County</i> American Potash and Chemical Co.	Trona	Trona

## PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of quarry
<i>Amador County</i> Industrial Minerals & Chemical Co.	b	836 Gilman St., Berkeley	Edwin
<i>Inyo County</i> Chas. Brown	a	Shoshone	Shoshone
Little Lake Pumice Co.	a	1204 S. Monterey St., Alhambra	Coso Junction
Red Mountain Cinder Quarry, H. P. Thelan	b	Little Lake	Little Lake
Paul H. Spilane	a	13539 Hart Ave., Van Nuys	Brown
Yonopah & Tidewater Ry.	b	510 W. 6th St., Los Angeles	Shoshone
<i>Kern County</i> Cudahy Packing Co.	b	803 Macy St., Los Angeles	Cenada
<i>Madera County</i> Elmer Erickson	a	Friant	Friant
<i>Mono County</i> Alexander Jamieson Pumice Product Co.	a a	Box 20, Big Pine 260 California St., San Francisco	Big Pine Benton
<i>Napa County</i> Basalt Rock Co. C. Ciero	a a	8th St., Napa 4261 23d St., San Francisco	Monticello Monticello
<i>San Luis Obispo County</i> Red Eagle Mine, M. L. Francis	b	Creston	Creston
<i>Siskiyou County</i> H. W. Free Klamath Concrete Pipe Co. Volcanic Products Co. Dan A. Williams	c a a a	156 Spring St., Klamath Falls, Oregon Klamath Falls, Ore. Harris Trust Bldg., Chicago, Ill. 217 Monterey St., Salinas	Glass Mt. Glass Mt. Glass Mt. Mt. Hoffman

a. Pumice. b. Volcanic ash. c. Scoria.

## PYRITE

Operator	Address	Location of mine
<i>Shasta County</i> Mountain Copper Co., Wm. F. Kett, Mgr.	351 California St., San Francisco	Matheson



QUICKSILVER

*Principal Quicksilver Producers in California for 1938, out of a Total of 65 Operating Properties*

Mine	Operator	Address	Location of mine
<i>Contra Costa County</i>			
Mt. Diablo.....	Bradley Mining Co.....	Crocker Bldg., San Francisco.....	Clayton.....
<i>Fresno County</i>			
Archer.....	Joseph Byles & Sons.....	Coalinga.....	Coalinga.....
<i>Inyo County</i>			
Coso Hot Spring.....	A. W. Leege.....	2233 Anacapa St., Santa Barbara.....	Little Lake.....
<i>Kern County</i>			
Cuddeback.....	Walabu Mining Co.....	Box 1168, Bakersfield.....	Keene.....
<i>Kings County</i>			
Kings.....	Bert Harvey.....	Parkfield.....	Parkfield.....
<i>Lake County</i>			
Great Western.....	Bradley Mining Co.....	Crocker Bldg., San Francisco.....	Middletown.....
Mirabel.....	Mirabel Quicksilver Co.....	Middletown.....	Middletown.....
Suphur Bank.....	Bradley Mining Co.....	Crocker Bldg., San Francisco.....	Lower Lake.....
<i>Monterey County</i>			
Patriquin.....	Franciscan Mining Co.....	Box 724, Monterey.....	Parkfield.....
<i>Napa County</i>			
Actua.....	J. F. Knapp.....	1401 Park Ave., Oakland.....	Monticello.....
Manhattan Mine.....	Chas. Wilson & W. M. Hickox.....	Monticello.....	Oat Hill.....
Oat Hill.....	J. Wenzel.....	Middletown.....	At Hill.....
Oat Hill Extension.....	Zack Anderson.....	Middletown.....	
<i>San Benito County</i>			
Aurora.....	San Benito Mining Co.....	Box 728, Salinas.....	Idria.....
New Idria.....	New Idria Quicksilver Mining Co.....	Mills Bldg., San Francisco.....	Idria.....
Stayton Quicksilver Mine.....	R. B. Knox.....	Hollister.....	Hollister.....
<i>San Luis Obispo</i>			
Deer Trail.....	J. H. Anderson & E. C. Ashurst.....	Box 951, Santa Maria.....	Adelaide.....
Klau.....	Klau Mine, Inc.....	Mills Bldg., San Francisco.....	Cambria.....
Oceanic.....	Anglo American Mining Corp.....	Mills Bldg., San Francisco.....	

QUICKSILVER—Continued  
Principal Quicksilver Producers in California for 1938, out of a Total of 55 Operating Properties

Mine	Operator	Address	Location of mine
<i>Santa Barbara County</i>			
Los Prietos.....	T. H. Canfield.....	Box 277, Santa Barbara.....	Santa Barbara
Red Rock.....	Santa Ynez Mercury Co., Hans Peters, Pres.....	Solvang.....	Solvang
<i>Santa Clara County</i>			
Guadalupe Mine.....	Leco Mining Co., H. N. Mason.....	R. F. D. 3, Box 412, Los Gatos.....	Los Gatos
New Almaden.....	Quicksilver Mining Co., P. R. Schneider.....	Los Gatos.....	Almaden
<i>Sonoma County</i>			
Cloverdale.....	Mr. George H. Burr (lessee).....	Cloverdale.....	Cloverdale
Contact.....	Contact Mercury Mines Co.....	Pine Flat.....	Pine Flat
Culver Bear.....	C. A. Baumber.....	Cloverdale.....	Cloverdale
Esperanza.....	James G. Cortelyou (owner).....	Cloverdale.....	Cloverdale
<i>Yolo County</i>			
Harrison Mine.....	J. W. Abercrombie & I. S. Hardester.....	Middletown.....	Rumsey

SALT

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SALT

Operator	Address	Location of plant
<i>Alameda County</i> Leslie Salt Co.....	310 Sansome St., San Francisco.....	Newark and Mt. Eden
<i>Butte County</i> Richardson Mineral Springs, Lee Richardson, Mgr.....	Richardson Springs.....	Richardson Springs
<i>Imperial County</i> Imperial Salt Co.....	4000 E. Washington Blvd., Los Angeles.....	Calipatria
<i>Kern County</i> Long Beach Salt Co.....	P.O. Box 28, Long Beach.....	Salt Dale
<i>Los Angeles County</i> Long Beach Salt Co.....	P.O. Box 28, Long Beach.....	Long Beach
<i>Modoc County</i> Surprise Valley Salt Works, Joshua H. Hutchinson.....	Box 26, Cedarville.....	Lake City
<i>Monterey County</i> Monterey Bay Salt Co., E. C. Vierra, Mgr.....	Moss Landing.....	Moss Landing
<i>Orange County</i> The Irvine Co.....	Tustin.....	Tustin
<i>San Bernardino County</i> California Rock-Salt Co..... Rock Salt Products Co.....	2465 Hunter St., Los Angeles..... 845 El Centro St., South Pasadena.....	Anboy Salt Marsh
<i>San Diego County</i> Western Salt Co.....	1245 National Ave., San Diego.....	San Diego
<i>San Mateo County</i> Stauffer Chemical Co.....	636 California St., San Francisco.....	Redwood City

## SANDSTONE

Operator	Address	Location of quarry
<i>Los Angeles County</i> R. L. Glover	917 W. 6th St., Los Angeles	Chatsworth
<i>Monterey County</i> Carmel Stone Quarry, A. L. Possadori Sierra Quarry, H. E. Rogers	Carmel Box 136, Carmel	Carmel Carmel
<i>Napa County</i> H. F. Galbreath	1668 Lincoln St., Berkeley	
<i>San Luis Obispo County</i> Mora Bros.	Box 121, Cambria	Cambria
<i>Shasta County</i> H. F. Galbreath	1668 Lincoln St., Berkeley	Ono

## SERPENTINE

Operator	Address	Location of mine
<i>San Bernardino County</i> Kennedy Clay Pit, John Kennedy	5009 O'Sullivan Dr., Los Angeles	Daggett

## SILICA

Operator	Product	Address	Location of mine
<i>Contra Costa County</i> Hazel-Atlas Glass Co. of California, Ltd.....	b	89th and G St., Oakland.....	Summerville Brentwood
<i>Silica Co. of California, Ltd.</i> .....	b		
<i>Monterey County</i> Del Monte Properties—Att. C. S. Olmsted.....	b	Del Monte.....	Del Monte
<i>Orange County</i> Arnold Clay Mine, I. P. Arnold.....		1846 W. 83d St., Los Angeles.....	El Toro
<i>Riverside County</i> P. J. Weisel, Inc. ....	b	La Habra.....	Corona
<i>San Bernardino County</i> Temescal Clay Co. ....	c	5601 S. Boyle Ave., Los Angeles.....	Hicks

a. Quartz. b. Glass sand. c. Quartzite.

## SILLIMANITE-ANDALUSITE-CYANITE GROUP

Operator	Product	Address	Location of mine
<i>Imperial County</i> Vitretrax Co. ....	Cyanite	500 Pacific St., Vernon, Los Angeles.....	Ogilby
<i>Mono County</i> Champion Spark Plug Co., Ceramic Division.....	Andalusite	Butler Ave. and Grand Trunk R.R., Detroit, Mich.....	Mocalno

**SILVER**  
Principal Silver Producers in California in 1933

Mine	Type of mine	Operator	Address	Post office of mine
<i>Amador County</i>				
Argonaut	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco	Jackson
Central Eureka & Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Kennedy	a	Kennedy Mining & Milling Co.	519 California St., San Francisco	Martell
<i>Butte County</i>				
Forbestown (Midas, Gold Bank)	a	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Forbestown
Suracee	a	Hoefting Bros.	400 N. 16th St., Sacramento	Yankee Hill
<i>Calaveras County</i>				
Carson Hill	a	Carson Hill Gold Mining Corp.	Melones	Melones
Mountain King	a	Jumbo Cons. Mining Co.	506 Bay Cities Bldg., Santa Monica	Copperopolis
<i>El Dorado County</i>				
Big Canyon	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle
<i>Imperial County</i>				
American Girl	a	O'Brien Mines, Inc.	Box 465, Ocean Beach	Ogilby
<i>Inyo County</i>				
Black Eagle	b	National Consolidated Mines Co.	1125 Central Bldg., Los Angeles	Lone Pine
Cardinal	a	Cardinal Gold Mining Co.	Bin D. Bishop	Bishop Creek
Copper Queen	a	Gold Bottom Mines, Inc.	Box 1556, Bakersfield	Trona
Defiance	c	Darwin Lead Co.	Darwin	Darwin
Golden Treasure	c	Ashford Bros.	Shoshone	Shoshone
Morning Star	c	Morning Star Keeler Mng. Co.	Keeler	Keeler
Reward (Brown Monster)	a	T. L. Bright	Independence	Independence
<i>Kern County</i>				
Big Blue	a	Kern Mines, Inc.	605 Market St., San Francisco	Kernville
Cactus Queen	c	Cactus Mines Co.	Rosamond	Rosamond
Elephant, Starlight and Lodestar	a	Lodestar Mining Co.	Box 235, Mojave	Mojave
Eureka	a	Morris Albertoli	Box 2028, Mojave	Mojave
Fairview	a	E. W. Little	Box 70, Star Route, Rosamond	Rosamond
Four Jacks	a	Four Jacks Mining Co.	Box 184, Mojave	Mojave
Golden Queen	a	Golden Queen Mining Co.	Box 296, Mojave	Mojave
Gypsy	a	Dick Moore & Ralph Hanev	Mojave	Mojave
Karna	a	E. L. Wegman	Mojave	Mojave
Standard	a	A. J. Bryce	Mojave	Mojave
Tropico	a	Burton Bros., Inc.	Rosamond	Rosamond
Whitmore	a	Whitmore Mines, Inc.	112 W. 9th St., Los Angeles	Rosamond
Yellow Aster	a	Anglo American Mining Corp.	Randsburg or 206 Sansone St., San Francisco	Randsburg

a. Gold mine. b. Silver mine. c. Lead-Silver mine. d. Gold-Silver mine. e. Gold dredge. h. Tailings dump. j. Copper mine.

SLATE

Operator	Product	Address	Location of quarry
<i>El Dorado County</i> Pacific Minerals Co., Ltd.	b	337 10th St., Richmond	Chili Bar
<i>Inyo County</i> Mt. Whitney Slate Quarries, R. B. McIlroy	b, c	Star R.F.D. No. 291, Lone Pine	Lone Pine
<i>Los Angeles County</i> Blue Goose Quarry, Robert Cox	c	1975 Lundy Ave., Pasadena	Pasadena
<i>Tuolumne County</i> Whitney Slate Quarry, W. S. McLean Estate	b	419 Bayshore Blvd., San Francisco	Hetch Hetchy

a. Roofing. b. Granules. c. Flagging.



## SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
<i>Butte County</i> McLean Talc Deposit, W. S. McLean Fst.....	a	419 Baysshore Blvd., San Francisco.....	McLean Spur
<i>El Dorado County</i> Jim Bennett.....	a	Shingle.....	Latrobe Shrub
Industrial Minerals & Chemical Co.....	a	826 Gilman St., Berkeley.....	
Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.....	a	337 10th St., Richmond.....	
<i>Inyo County</i> Blue Star Talc Mine, Ltd.....	b	840 S. San Julian St., Los Angeles.....	Zurich
Death Valley Talc Co., Att. W. I. Jacobs, Sec'y.....	b	1922 N. Kenmore, Los Angeles.....	Furnace Creek
Sierra Talc Co., Franklin Booth, Mgr.....	b	428 Union League Bldg., Los Angeles.....	Keeler
Western Talc Co.....	b	1901 E. Slauson Ave., Los Angeles.....	Death Valley
<i>Los Angeles County</i> Binder Bros., W. H. Binder.....	a	285 N. Lake Ave., Pasadena.....	Bouquet Canyon
<i>San Bernardino County</i> Pacific Coast Talc Co.....	b	2149 Bay St., Los Angeles.....	Silver Lake
Southern Calif. Minerals Co., W. S. Skeoch.....	b	320 Mission Rd., Los Angeles.....	Kingston Mt.

a. Soapstone. b. Talc.

## SODA

Operator	Product	Address	Location of plant
<i>Inyo County</i> Natural Soda Products Co.....	a, b, d	405 Montgomery St. San Francisco.....	Keeler
Pacific Alkali Co.....	a	1206 Pacific Mutual Bldg., Los Angeles.....	Bartlett
<i>San Bernardino County</i> American Potash & Chemical Co.....	a, c	Trona.....	Trona
West End Chemical Co.....	a	Latham Square Bldg., Oakland.....	West End

a. Soda Ash. b. Sodium Bicarbonate. c. Salt Cake. d. Trona.

STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produce both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
<i>Alameda County</i>			
California Rock & Gravel Co.	a	500 Call Bldg., San Francisco.	Livermore
Hanifen Trucking Co.	a, b	344 High St., Oakland.	Pleasanton
Heafey-Moore Co., Leona Quarry	a, b	1522 Latham Square Bldg., Oakland.	Oakland
Henry L. Kaiser Co.	a, b	5998 Strabridge Ave., Hayward.	Hayward
Kemper Bros.	c	R.F.D., Box 89, Niles.	Decoto
Langdon Molding Sand, J. H. Langdon.	d	419 Bayshore Blvd., San Francisco.	Arroyo Mocho
Red Shale Quarry, W. S. McLean.	a, b	85 2d St., San Francisco.	Eliot and Niles
Pacific Coast Aggregates, Inc.	a, b	Box 943, Livermore.	Livermore
Alfred W. Petersen.	a, b	1192 Russell Way, Hayward.	Hayward
Thos. B. Russell Quarry, T. B. Russell.	b	2485 Washington St., San Leandro.	Lake Chabot
San Leandro Rock Co., Lake Chabot Quarry.	b	Southern Pacific Bldg., San Francisco.	Eliot, Niles, Radium
Southern Pacific R.R. Co., Asst. Chief Engineer.	a, b	Broadway and McAdams St., Oakland.	Oakland
Superior Rock Co.	b		
<i>Butte County</i>			
Bochtel-Kaiser Rock Co., R. J. Kennedy, Mgr.	a, b	Oroville.	Oroville
J. E. Johnson Rock Co.	b	Weber Ave. and E St., Stockton.	Chico
McKen's Quarry, W. S. McLean.	d	419 Bayshore Blvd., San Francisco.	McLean Spur
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco.	Oroville
Western Pacific R.R. Co., E. W. Mason, Gen. Sup't.	a	Mills Bldg., San Francisco.	
<i>Calaveras County</i>			
Pacific Minerals Co., Ltd.	d	337 10th St., Richmond.	Angels
<i>Contra Costa County</i>			
Antioch Asphalt Sand Co.	a	2008 Mission St., San Francisco.	Antioch
Basalt Rock Co.	a	8th St., Napa.	Antioch
Blake Bros. Co., Anson Blake.	b	204 Balboa Bldg., San Francisco.	Point Richmond
Hutchinson Co., Siege Quarry	b	329 17th St., Oakland.	Sege
Henry J. Kayser Co.	a	1522 Latham Square Bldg., Oakland.	Newlove
Ed Roberts.	c	Pittsburg.	Pittsburg
Silica Co. of Calif., Ltd.	c	Brentwood.	Brentwood
Southern Pacific R.R. Co., Asst. Chief Engineer.	a	Southern Pacific Bldg., San Francisco.	Newlove
E. Stamm.	a	Antioch.	Antioch
<i>Del Norte County</i>			
Hemstreet & Bell.	b	411 C St., Marysville.	Prescent City

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder.

a. Sand and gravel. b. Crushed rock (macadam, ballast, f. Tubemill pebbles. g. Decomposed granite.  
\*Consolidated July 1, 1938 to form Grant-Pacific Rock Co.

\*Consolidated July 1, 1938 to form Grant-Pacific Rock Co.

## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Los Angeles County—Continued</i>			
Consolidated Rock Products Co.	a, b	2730 S. Alameda St., Los Angeles	Whittier and Fullerton
Ducey & Atwood Rock Co., R. K. Atwood, Pres.	a, b	Box 194, East Pasadena	East Pasadena
Eastside Building Materials Co.	a	8830 Santa Monica Blvd., Los Angeles	
Eaton Canyon Rock & Sand Co.	a, b	Box 95, East Pasadena	East Pasadena
W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	Brentwood Heights
Graham Bros.	a, b	3425 Fowler Ave., Los Angeles	Catalina Island and Roscoe
Granite Material Co.	g	8200 Tujunga Ave., Roscoe	Roscoe
John D. Gregg	a, b	Box 110, Whittier	Whittier
Haines Canyon Rock Co., John M. Ferry	a, b	5201 San Fernando, Glendale	Glendale
Hildecker Brick Co.	b	1117 S. Boyle Ave., Los Angeles	Bouquet Canyon
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Bureau of Water Works and Supply, Att. H. A. Van Norman	a	207 S. Broadway, Los Angeles	
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Manning Bros. Rock & Sand Co.	a, b	Irwindale	Irwindale
Owl Truck & Materials Co.	b	Box 509, Compton	Compton
Pacific Rock & Gravel Co.	a, b	800 Lane Mortgage Bldg., 208 W. 8th St., Los Angeles	
Ronalds Crushed Gravel	g	920 N. Humphreys Ave., Los Angeles	Los Angeles
Rehl-Corley Co.	b	4351 Alhambra Ave., Los Angeles	Catalina Island
Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	Lomita
State Decomposed Granite Co.	g	8455 Santa Monica Blvd., Los Angeles	Los Angeles
J. H. Weadle	a, b	Monrovia	Monrovia
<i>Marin County</i>			
Daniels Const. Co.	b	503 Market St., San Francisco	San Rafael
Hutchison Co.	b	329 17th St., Oakland	San Quentin
<i>Mariposa County</i>			
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
<i>Merced County</i>			
Bair Creek Sand & Gravel Co., J. W. Huffman	a	Merced	
Frank B. Marks	a, b	Newman	Los Banos
<i>Modoc County</i>			
Great Northern Railway, A. E. Knight, Supt.	e	Klamath Falls, Ore.	Mammoth
Southern Pacific R. R. Co., Att. Asst Chief Engineer	b	Southern Pacific Bldg., San Francisco	Goose Lake

<i>Monterey County</i>	
Del Monte Properties, C. S. Olmsted.....	a, c
M. J. Murphy.....	a
Pacific Coast Aggregates, Inc.....	a
S. Ruthven, Seaside Sand Pit.....	a
Southern Pacific Co.....	a
Tynan Lumber Co.....	a
<i>Napa County</i>	
Basalt Rock Co.....	b
Errington Quarry & Juarez Quarry, M. L. Reidenbach.....	b
Southern Pacific R.R. Co., Att. Asst Chief Engineer.....	b
Thorsen Gravel Pit, Harry Thorsen.....	a
<i>Nevada County</i>	
D. T. Brown.....	a, b
Netz Granite Quarry, Ludwig Netz.....	b
<i>Orange County</i>	
E. M. Barris Sand & Gravel Co.....	a
California Rock Co.....	a, b
Consolidated Rock Products Co.....	a
Foster Sand & Gravel Co., W. Commonwealth.....	a
Fowler Sand & Gravel Co.....	a
Graham Bros.....	a, b
National Cement Pipe Co.....	a
B. A. Stoffel.....	a
<i>Placer County</i>	
Rosville Sand Co.....	a
A. Teichert & Son, Inc.....	a
Union Granite Co., Ruhkala Bros.....	b
Victor Workman.....	b
<i>Plumas County</i>	
Western Pacific R.R. Co., E. W. Mason, Gen. Sup't.....	b
<i>Riverside County</i>	
A. T. & S. F. R.R. Co., I. L. Hibbard, Gen. Mgr.....	b
Concrete Rock & Sand Co.....	a
City of Riverside.....	b
Rohi-Connelly Co., Ormond Quarry.....	b
San Geronimo Rock Co.....	a
The Service Gravel Co., F. A. Braman.....	a
J. F. Shen Co., Inc.....	a
P. J. Weisel, Industrial Sands.....	a, c

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

Del Monte.....	Del Monte.....	Del Monte.....
Monte Verde and 9th Sts., Carmel.....	85 2d St., San Francisco.....	Carmel.....
Seaside.....	Seaside.....	Lapis and Pratto.....
Salinas.....	65 Market St., San Francisco.....	Seaside.....
8th St., Napa.....	8th St., Napa.....	Salinas.....
Napa.....	Napa.....	Napa.....
Southern Pacific Bldg., San Francisco.....	Southern Pacific Bldg., San Francisco.....	Rocktram.....
St. Helena.....	St. Helena.....	St. Helena.....
Grass Valley.....	Grass Valley.....	Grass Valley.....
Nevada City.....	Nevada City.....	Nevada City.....
Newport Beach.....	Newport Beach.....	Newport Beach.....
R.F.D., Orange.....	R.F.D., Orange.....	Orange.....
2730 S. Alameda St., Los Angeles.....	2730 S. Alameda St., Los Angeles.....	Fullerton and Orange.....
Fullerton.....	Fullerton.....	Fullerton.....
1178 S. Flower St., Santa Ana.....	1178 S. Flower St., Santa Ana.....	Santa Ana.....
3425 Fowler Ave., Los Angeles.....	3425 Fowler Ave., Los Angeles.....	El Modena.....
Box 596, Santa Ana.....	Box 596, Santa Ana.....	Santa Ana.....
Anaheim.....	Anaheim.....	Anaheim.....
115 Jones St., Roseville.....	115 Jones St., Roseville.....	Roseville.....
1846 37th St., Sacramento.....	1846 37th St., Sacramento.....	No. Fork American River.....
Rocklin.....	Rocklin.....	Rocklin.....
Mills Bldg., San Francisco.....	Mills Bldg., San Francisco.....	Rocklin.....
609 Kerckhoff Bldg., Los Angeles.....	609 Kerckhoff Bldg., Los Angeles.....	Corona.....
899 La Cadena St., Colton.....	899 La Cadena St., Colton.....	Colton.....
Riverside.....	Riverside.....	Riverside.....
4351 Valley Blvd., Los Angeles.....	4351 Valley Blvd., Los Angeles.....	Bly Junction.....
Banning.....	Banning.....	Banning.....
4324 10th St., Riverside.....	4324 10th St., Riverside.....	Riverside.....
617 S. Olive St., Los Angeles.....	617 S. Olive St., Los Angeles.....	Banning.....
La Habra.....	La Habra.....	Corona.....

## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Sacramento County</i>			
Brighton Sand & Gravel Co.	a, b	P. O. Box 2604, Sacramento.	Sacramento
Canon & Co.	c	Box 281, Sacramento.	Ben Ali
Del Paso Rock & Gravel Co.	a, b	H St. Rd., Sacramento.	Del Paso
Folsom State Prison	b	Represa.	Represa
Lord & Bishop.	a	P. O. Box 812, Sacramento.	American River
Mucke Sand & Gravel Co.	a, b	1433 57th St., Sacramento.	Mayhew
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco.	Fair Oaks, Mayhew and American River
Perkins Gravel Co.	a, b	Perkins.	Perkins
Robert Powell & Co.	a	Box 815, Sacramento.	American River
<i>San Benito County</i>			
Granite Rock Co.	b	Drawer M. Watsonville.	Logan
Southern Pacific Co.	a, b	65 Market St., San Francisco.	Logan
<i>San Bernardino County</i>			
A. T. & S. F. R.R.	a	600 Kerekhoff Bldg., Los Angeles.	Gale
Commercial Rock Co.	a, b	14th and Campus, Upland.	Upland
Consolidated Rock Products Co.	a	2730 S. Alameda St., Los Angeles.	San Bernardino
Fourth Street Rock Crusher, A. O. Johnson.	a	San Bernardino.	Barstow
Pacific Minerals, Inc.	d	337 10th St., Richmond.	Redlands
Pinneys Sand & Rock Service.	a, b	Redlands.	Redlands
Redlands Gravel Co.	a, b	Box 249, San Bernardino.	San Bernardino
San Bernardino Rock & Gravel Co.	a, b	Southern Pacific Bldg., San Francisco.	Deelevelville
Southern Pacific R.R. Co., Asst. Chief Engineer.	a, b	San Bernardino.	San Bernardino
Triangle Rock & Gravel Co.	a, b		
<i>San Diego County</i>			
Calaveras Materials Co.	b	Oceanside.	Oceanside
Canyon Rock Co.	a, b	3911 5th Ave., San Diego.	San Diego
Crystal Silica Sand Co.	a	Oceanside.	Oceanside
H. G. Fenton Material Co.	a	13th and Imperial Ave., San Diego.	San Diego
Elvira M. Hubbard.	c	406 W. Nutmeg St., San Diego.	San Diego
Nelson & Sloan.	a	Box 832, Chula Vista.	Chula Vista
Oceanside Rock & Sand Co.	a	Carlsbad.	Oceanside
<i>San Francisco County</i>			
Mission Quarry Co.	b	210 Balboa Bldg., San Francisco.	San Francisco

18.

<i>San Joaquin County</i>			
Frank Marks	a	Newman	Tracy
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Santa Fe Sand and Gravel Co., W. A. Arlington		Box 271, Escalon	Escalon
Elmer J. Warner	a	R.F.D. 3, Box 85, Stockton	Stockton
<i>San Luis Obispo County</i>			
Gutten Molding Sand, Harold E. Gutten	c	Oceano	Oceano
Renolds Quarry, Thomas C. Renolds	b	Box 53, Paso Robles	Paso Robles
<i>San Mateo County</i>			
Industrial Mineral Products, W. B. Vestal, Pres	c	400 7th St., San Francisco	
Market Street Ky. Co., Daly's Quarry	b	38 Sutter St., San Francisco	Daly City
<i>Santa Barbara County</i>			
Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
<i>Santa Clara County</i>			
Anderson Gravel Co.	a	Mountain View	Mountain View
Carroll Gravel Pnt, R. D. Carroll	a	R.F.D. 14, Box 310A, San Jose	San Jose
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
Phas. W. Hamilton	a	Scifer Rd., San Jose	San Jose
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
Rhodes & Robinson, Stanlord Quarry	b	Box 325, Palo Alto	Palo Alto
Southern Pacific Co.	a	65 Market St., San Francisco	Coyote
<i>Santa Cruz County</i>			
Central Supply Co.	a	Box 524, Santa Cruz	Santa Cruz
Henry J. Kaiser Co.	a	1522 Latham Square Bldg., Oakland	Olympia
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Olympia
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz
<i>Shasta County</i>			
Dieselhorst Gravel Plant, Chas. Dieselhorst	a, b	1040 Liberty St., Redding	Redding
Lassen Volcanic Nat'l Park, Superintendent	b	Mineral via Red Bluff	Lassen Nat'l Park
Oaks Gravel Plant, G. E. Oaks	a	1341 Yuba St., Redding	Girvan
Southern Pacific R.R. Co., Asst. Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kennett
<i>Sierra County</i>			
Hemstreet & Bell	b	411 C St., Marysville	Downieville
<i>Siskiyou County</i>			
King Solomon Mines Co.	f	Crocker Bldg., San Francisco	Black Bear
W. D. Miller Cons. Co.	a	Box 168, Klamath Falls, Ore.	Graham Siding
Southern Pacific R.R. Co., Asst. Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kegg
A. Young	a	345 N. Main St., Yreka	Yreka

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder.  
f. Tubemill pebbles. g. Decomposed granite.



## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Solano County</i>			
Hartley Sand & Gravel Co., J. J. Hartley, Prop.	a	Dixon	Dixon
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
<i>Sonoma County</i>			
Basalt Rock Co.	a	8th St., Napa	Healdsburg
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point
<i>Stanislaus County</i>			
W. Heslan	a	Oakdale	Oakdale
O. A. Kauffman	a	803 First St., Modesto	Modesto
Frank B. Marks	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Pacific Coast Aggregates, Inc.	a, b	85 Second St., San Francisco	Oakdale
Pumas Sand & Gravel Co.	a	Box 486, Modesto	Modesto
Rinehart Sand Pit, H. T. Rinehart	a	Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Southern Pacific Co.	a	65 Market St., San Francisco	Newman
Chas. Warner	a	Modesto	Modesto
<i>Trinity County</i>			
Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Sup't.	b	Sausalito	Island Mountain
<i>Tulare County</i>			
Dinuba Cement Co.	a	Dinuba	Dinuba
Independent Construction Co.	b	Foot of 47th Ave., Oakland	Porterville
O. C. Jeffers	a	1032 River Rd., Porterville	Lemon Cove and Lindsay
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Porterville
Portville Cement Pipe Co.	a	Box 396, Porterville	Porterville
W. R. Spalding Lumber Co.	a, b	Visalia	Visalia
<i>Tuolumne County</i>			
Beerman & Jones	b	Sonora	Soulsbyville
<i>Ventura County</i>			
El Rio Rock Co.	a, b	Box 381, Ventura	El Rio
Montalvo Rock Co.	a	Box 188, Montalvo	Montalvo
Piru Rock Co.	a, b	Piru	Piru
Santa Paula Rock Co.	a	Willard Bridge, Santa Paula	Santa Paula
Satecoy Rock Products Co.	a, b	Ventura	Satecoy-Ventura
J. S. Toledano	c	1257 Poli St., Ventura	Ventura
Southern Pacific Co.	a, b	65 Market St., San Francisco	Rockbank and Chrisman



<b>Yolo County</b>			
Beckwith Bros.....			Broderick.....
Leroy Kerr.....	a		Yolo.....
Frank Newman.....	a		Woodland.....
Joe Schwargruber.....	a		Woodland.....
George Summers.....	a		Woodland.....
Yolo Gravel Co.....	a		Box 7, Yolo.....
<b>Yuba County</b>			
Hemstreet & Bell.....	a, b		501 11th St., Marysville.....
Pacific Coast Aggregates, Inc.....	a		85 2d St., San Francisco.....
Yuba River Sand Co.....	a		Marysville.....
a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.			

## SULPHUR

Operator	Address	Location of mine
<i>Inyo County</i> Western Mining Co.	1427 E. 4th St., Los Angeles	Last Chance Mts.

## TUNGSTEN

Mine	Operator	Address	Location of mine
<i>Fresno County</i> Quigley Bros. Mine	Geo. W. Quigley	Box 63, Auberry	Kings River
<i>Inyo County</i> Bishop Pine Creek Rossi Tungsten City Tungsten City	El Diablo Mining Co., H. O. Johanson U. S. Vanadium Bishop Tungsten Company, A. T. Wilkerson El Diablo Mining Company, H. O. Johanson Tungsten Milling Co., Raymond A. Stolle	Bishop Bishop Bishop Bishop Box 461, Bishop	Bishop Bishop Bishop Bishop Bishop
<i>Mono County</i> Black Rock Tungsten Mine	Tungsten Corp. of Calif.	811 W. 7th St., Los Angeles	Benton
<i>San Bernardino</i> Atolia Adelanto Bille A. Mine North Tungsten Fields	Atolia Mining Co. Nicholas Baxter R. T. Raso Shadow Mountain Tungsten, Inc.*	1022 Crocker Bldg., San Francisco 1316 Perris St., San Bernardino Victorville 715 Commercial Exchange Bldg., Los Angeles	Atolia Adelanto Victorville Adelanto
<i>Tulare County</i> Tungsten	Tungsten Mines	929 American Ave., Long Beach	Posey

\*Gave up lease in 1938.

## APPENDIX

## PUBLIC RESOURCES CODE

An act to establish a Public Resources Code, thereby consolidating and revising the law relating to natural resources, the conservation, utilization, and supervision thereof, and matters incidental thereto, and to repeal certain acts and parts of acts specified herein.

Chapter 93 (Stat. 1939.)

*The people of the State of California do enact as follows:*

## GENERAL PROVISIONS.

1. This act shall be known as the Public Resources Code.
2. The provisions of this code, in so far as they are substantially the same as existing provisions relating to the same subject matter shall be construed as restatements and continuations thereof and not as new enactments.
3. All persons who, at the time this code goes into effect, hold office under any of the acts repealed by this code, which offices are continued by this code, continue to hold the same according to the former tenure thereof.
4. No action or proceeding commenced before this code takes effect, and no right accrued, is affected by the provisions of this code, but all procedure thereafter taken therein shall conform to the provisions of this code so far as possible.
5. Unless the context otherwise requires, the general provisions hereinafter set forth shall govern the construction of this code.
6. Division, part, chapter, article, and section headings contained herein shall not be deemed to govern, limit, modify or in any manner affect the scope, meaning, or intent of the provisions of any division, part, chapter, article, or section hereof.
7. Whenever, by the provisions of this code, an administrative power is granted to a public officer or a duty imposed upon such officer, the power may be exercised or the duty performed by a deputy of the officer or by a person authorized pursuant to law.
8. Writing includes any form of recorded message capable of comprehension by ordinary visual means. Whenever any notice, report, statement or record is required by this code, it shall be made in writing in the English language.
9. Whenever any reference is made to any portion of this code or of any other law of this State, such reference shall apply to all amendments and additions thereto now or hereafter made.
10. "Section" means a section of this code unless some other statute is specifically mentioned.
11. The present tense includes the past and future tenses; and the future the present.
12. The masculine gender includes the feminine and neuter.
13. The singular number includes the plural, and the plural the singular.
14. "County" includes "city and county."
15. "Shall" is mandatory and "may" is permissive.
16. "Oath" includes affirmation.
17. "Signature" or "subscription" includes mark when the signer or subscriber can not write, such signer's or subscriber's name being written near the mark by a witness who writes his own name near the signer's or subscriber's name; but a signature or subscription by mark can be acknowledged or can serve as a signature or subscription to a sworn statement only when two witnesses so sign their own names thereto.
18. If any provision of this code, or the application thereof to any person or circumstances, is held invalid the remainder of the code, and the application of its provisions to the other persons or circumstances, shall not be affected thereby.

## DIVISION 1. THE DEPARTMENT OF NATURAL RESOURCES.

501. There is in the State government a Department of Natural Resources. The department shall be conducted under the control of an executive officer known as the Director of Natural Resources. The director shall be appointed by and hold office at the pleasure of the Governor and shall receive a salary of six thousand dollars a year.

502. Except as in this division otherwise provided, the provisions of article II, Chapter III, Title I, Part III of the Political Code shall govern and apply to the conduct of the Department of Natural Resources in every respect the same as if such provisions were herein set forth at length, and wherever in that article the term "head of the department" or similar designation occurs, it shall for the purposes of this division mean the Director of Natural Resources.

503. For the purposes of administration the department shall be organized by the director, subject to the approval of the Governor, in such manner as he deems necessary properly to segregate and conduct the work of the department. The director may appoint, in accordance with the civil service and other provisions of law, such deputies, officers, and other expert and clerical assistants as may be necessary.

504. The work of the department shall be divided into at least four divisions, known as Division of Forestry, the Division of Parks, The Division of Fish and Game, and The Division of Mines.

505. The Division of Forestry shall be administered through a chief who shall be known as the State Forester. He shall be a technically trained forester, appointed by the director upon nomination by the State Board of Forestry. General policies for the guidance of the Division of Forestry shall be determined by a State Board of Forestry which shall consist of seven members appointed by and holding office at the pleasure of the Governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with live stock industry, one with general agriculture, and one with the problems of water conservation.

506. The Division of Parks shall be administered through a chief who shall be appointed by the director upon nomination by the State Park Commission. General policies for the administration of the State park system shall be determined by the State Park Commission which shall consist of five members appointed by and holding office at the pleasure of the Governor.

507. The Division of Mines shall be administered through a chief who shall be known as the State Mineralogist. He shall be a technically trained mining engineer, appointed by the director upon nomination by the State Mining Board. General policies for the guidance of the Division of Mines shall be determined by a State Mining Board, which shall consist of five members appointed by and holding office at the pleasure of the Governor.

508. The Division of the Department of Natural Resources for the supervision of oil and gas shall be in charge of a chief, known as the State Oil and Gas Supervisor.

509. The salaries of the chiefs of the Divisions of Forestry and Parks shall be fixed by the director with the approval of the Governor. The director and the chief of each division, before entering upon his duties, shall execute and deliver to the State an official bond in the sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties.

510. The members of the Board of Forestry and the State Park Commission shall serve without compensation, but shall be entitled to their actual necessary expenses incurred in the performance of their duties.

512. The Department of Natural Resources may expend the money in any appropriation or in any special fund in the State treasury made available by law for the administration of the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office, or officer whose duties, powers, and functions have been transferred to and conferred upon the department. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which the appropriations were made or the special funds created.

513. The department shall have possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property, real or personal held for the benefit or use of all bodies, offices, and

officers whose duties, powers, and functions have been transferred to and conferred upon the department.

514. Nothing in this code is intended to supersede, modify or change the effect of the enactment of section 373g of the Political Code, and wherever in this code reference is made to any officer or agency of the Department of Natural Resources, it is made in the sense and with the same legal effect as was attributable thereto in the statute whence derived and which would continue to be so attributable but for the adoption of this code.

## DIVISION II. MINES AND MINING.

### CHAPTER 1. DEFINITIONS.

2001. Unless the context otherwise requires, the definitions hereinafter set forth shall govern the construction of Division II of this code.

2002. "Department" in reference to the government of this State, means the Department of Natural Resources.

2003. "Division" in reference to the government of this State, means the Division of Mines in the Department of Natural Resources.

2004. "Person" includes any individual, firm, association, corporation, or any other group or combination acting as a unit.

### CHAPTER 2. THE DIVISION OF MINES.

2200. For the purposes of this chapter "mine" includes all mineral bearing properties of whatever kind or character, whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained. "Mineral" for the purposes of this chapter includes all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

2201. The State Mineralogist shall employ competent geologists, field assistants, qualified specialists, and office employees when necessary in the execution of the plans and operations of the division under this chapter and shall fix their compensation.

2202. The State Mineralogist shall maintain offices, and a museum, library, and laboratory in San Francisco for the purposes provided in this chapter.

2203. The State Mineralogist shall make a biennial report to the Governor on or before the fifteenth day of September next preceding the regular session of the Legislature.

2204. The State Mineralogist may receive on behalf of this State, for the use and benefit of the division, gifts, bequests, devices, and legacies of real or other property and may use the same in accordance with the wishes of the donors. If no instructions are given by the donors, the State Mineralogist shall manage, use, and dispose of the gifts, bequests, and legacies for the best interests of the division and in such manner as he may deem proper.

2205. The State Mineralogist shall:

(a) Make, facilitate, and encourage special studies of the mineral resources and mineral industries of the State.

(b) Collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use.

(c) Make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance such collection constituting the museum of the division.

(d) Provide a library of books, reports, and drawings bearing upon the mineral industries, the sciences of mineralogy and geology, and the arts of mining and metallurgy, such library constituting the library of the division.

(e) Make a collection of models, drawings, and descriptions of the mechanical appliances used in mining and metallurgical processes.

(f) Preserve and so maintain such collections and library as to make them available for reference and examination, and open to public inspection at reasonable hours.

(g) Maintain, in effect, a bureau of information concerning the mineral industry of this State to consist of such collections and library, and arrange, classify,

catalogue, and index the data therein contained, in a manner to make the information available to those desiring it.

(h) Issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this State.

2206. The State Mineralogist may prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the State.

2207. The owner, lessor, lessee, agent, manager, or other person in charge of any mine of whatever kind or character within the State shall forward to the State Mineralogist, upon his request, at his office, not later than the thirty-first day of March in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men employed, the method of working the mine and the general condition thereof, and the total mineral production for the past year. He shall also furnish any additional information relative to such mine that the State Mineralogist may from time to time require for the proper discharge of his official duties. Any such person who fails to comply with the provisions of this section is guilty of a misdemeanor.\*

2208. The State Mineralogist or a qualified assistant may at any time enter or examine any and all mines, quarries, wells, mills, reduction works, refining works, and other mineral properties or working plants in this State in order to gather data to comply with the provisions of this chapter.

2209. The State Mineralogist may fix a price upon and dispose of to the public all publications of the division, including reports, bulletins, maps, registers, or other publications. The price shall approximate the cost of publication and distribution. He may also furnish the publications of the division to public libraries without cost and may exchange publications with geological surveys, scientific societies, and other like bodies.

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\* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."

## PUBLICATIONS OF THE DIVISION OF MINES

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During the past fifty-six years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available for reference, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Santa Paula, Taft, Bakersfield, Coalinga. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained postpaid by addressing the Sacramento, San Francisco or Los Angeles offices and enclosing the requisite amount in the case of publications that have a list price.

Remittances of stamps in an amount not to exceed 26 cents, currency or coin will be accepted at sender's risk. Payment is preferred in the form of money orders.

Money orders should be made payable to the Division of Mines.

**NOTE.**—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.

Write for latest revised price list.

## REPORTS

	Price (including postage and sales tax)
Asterisks (**) indicate the publication is out of print.	
**First Annual Report of the State Mineralogist, 1880, 43 pp. Henry G. Hanks	----
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